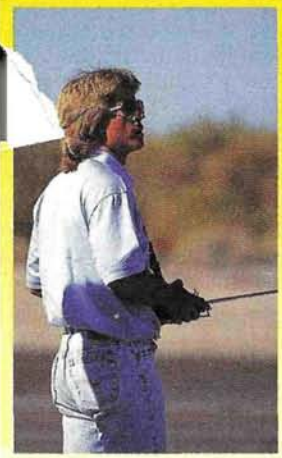
March1991

HOW TO MAKE YOUR WINGS SMOKE!

MODEL AIRPLANE NEWS

THE WORLD'S PREMIER R/C MODELING MAGAZINE

48120



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MARCH 1991 VOLUME 119, NUMBER 3

MODEL AIRPLANE NEWS

FEATURES

ON THE COVER: *Chip Hyde (upper left), 1st-place winner of this year's Tournament of Champions (see page 42) calmly flies his Ultimate Bipe in the heat of competition; John Britt's Steen Skybolt (upper right) took "Best Model." Center: Chip's Ultimate on landing approach. Top panel: TOC spectators; top right: Curtiss Youngblood's modified X-Cell flies during a competition break. Bottom right: Optimized Electric (see Part II, page 32). All photos are by Yamil Sued. Bottom left: Andreas Gietz's DC-3 (photo by Dick Phillips; see the article on the QSAA, page 60).*

HELICOPTER SECTION

CONSTRUCTION

COLUMNS

COLUMNS

DEPARTMENTS

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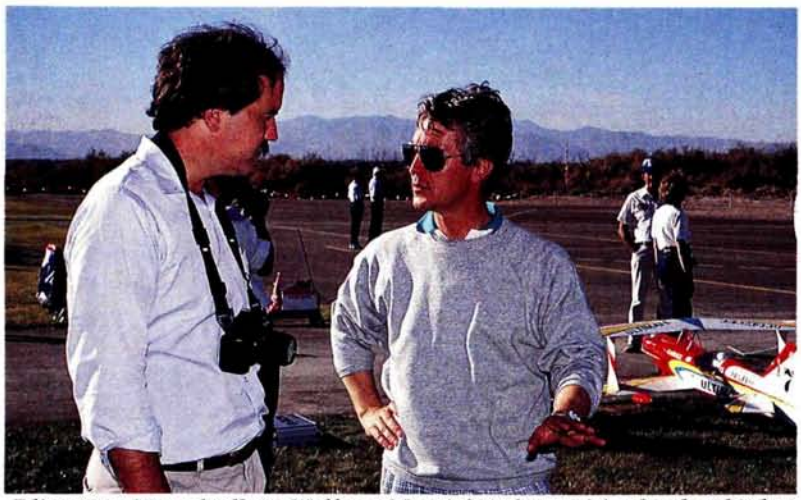
EDITORIAL

by TOM ATWOOD



Editor Tom Atwood talks to Wolfgang Matt (of Liechtenstein), who placed 3rd at the 1990 Tournament of Champions.

I'M WRITING on the 87th anniversary of the Wright brothers' first powered flight (Dec. 17, 1903). Although some claim that Whitehead's design may have achieved a powered ROG earlier, no one disputes the creative, analytical and mechanical genius of the Wright brothers. If you're interested in learning more about their thought processes and achievements as they "invented the wheel," I recommend two books:

• The first—"Wind and Sand" by Lynanne Wescott and Paula Degen (Harry N. Abrams, Inc. of New York, 1983)—is a compilation of the Wright brothers' personal photos and journal entries, and it's an eye-opener.

• The second—"Wilbur and Orville" (Alfred A. Knopf, 1987)—is a comprehensive biography that's written by Fred Howard, a member of the team who edited the Wright Papers in the Library of Congress. This volume details their story and provides fascinating background information about what others were doing at the time to achieve the same goal.

Whenever we test-fly a new design, we share in the creative spirit of the early aviators, and I think that's one of the great delights of aeromodeling. The fact that there remains so much "uncharted" territory can really whet the workshop tinkerer's appetite. For example, there are no definitive answers yet on what is the slowest payload-lifting plane; the "safest" R/C plane capable of flying outdoors; or the best configuration for an electric-powered ducted-fan—and the list goes on. The emergence of gliders with fully pivoting main wings, and the bizarre variety of designs for military RPVs that have been cooked up in recent years, all point to the fertile territory that awaits R/C designers.

To bring some of this excitement to you, we'll offer short, but informative, articles on aerodynamics that can assist in design (e.g., Joe Wagner's piece on propellers), and we'll also cover design contests (including our own). Look for reports on the projects of the backyard, mechanical wizards among our ranks; for a starter, see this issue's "Air Scoop." If *you* know of an exciting design project that you think our readers would like to see, drop us a line.

MODEL AIRPLANE NEWS

THE WORLD'S PREMIER R/C MODELING MAGAZINE

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AIRWAVES

WHERE TO WRITE TO US
If you're writing to the editors (and we'd love to hear from you), please be sure to address your letters to "Airwaves," *Model Airplane News*, 251 Danbury Road, Wilton, CT 06897. Only subscription orders and inquiries are handled by our Customer Service Department in Mount Morris, IL; other mail addressed there must be forwarded to Connecticut, and this leads to long delays.

AMA CLARIFIES INSURANCE CHANGES

I read Louis Guerrieri's letter in "Airwaves," and I need to clarify the situation.

The AMA board has two fundamental concepts that conflict with each other when it comes to insurance benefits. This will always be so! On one hand, as one of its services to its members, AMA wishes to provide insurance coverage to protect them. On the other hand, the very need for liability insurance protection also requires protection of the fund set aside for loss reimbursement to insure it against rapid or catastrophic reduction.

Many of Mr. Guerrieri's ideas have some merit; however, the urgency appears to be misplaced. This is because he overlooks one extremely significant point; namely, AMA coverage has always been secondary to other coverage (typically, "homeowners"). Contrary to his letter, this is not a situation where an AMA member is left without available coverage for a co-AMA member's injuries; this is an individual and personal decision to carry personal liability protection.

Homeowner's coverage has always been and should continue to be the first line of coverage. More important, there has been a significant increase in AMA's medical coverage for 1991. The increase in medical reimbursement a member can receive by merely filing a claim has been changed from $7,500 to $100,000. This increase was solely for the purpose of redirecting medical benefits to the Accident/Medical policy for member-to-member bodily injuries that are no longer being covered under the liability policy. The amount of coverage ($100,000) was predicated on the satisfaction of past medical costs resulting from a single AMA member's accident experience. This figure was also based on AMA's coverage being primary in the event that there is no group health coverage available.

In addition, the medical coverage is applicable to any modeling injury no matter who causes the accident—even if you flew into yourself. Benefits are paid by merely filing with the primary carrier—usually an employee group health plan—and then AMA. This change means a member can receive medical compensation without the need to sue another member. The elimination of liability between members and those whom the member injures in his own family was implemented to turn the tide of ever-increasing suits involving millions of dollars in demand for undefined claims of pain, suffering, shock, trauma, etc.

Although member-to-member liability coverage *is* being eliminated in 1991, there is no change in coverage under the current certificate of insurance issued to property owners for club flying sites. This document is in effect through the club charter until March 31, 1991. Both the club and its additional "insureds" are fully protected, as before. A property owner named in a suit over an accident caused by one AMA member to another would be covered by the AMA liability policy.

Elimination of member-to-member liability coverage should not have any effect on property owners when the club re-charters in 1991. We realize that the property owner needs liability protection when two AMA members are involved in an accident.

I hope my comments will clarify the coverage issues related to the Academy's insurance program and the necessity to minimize risk and exposure to unjustified claims. I appreciate the opportunity to comment on this letter.

CARL P. MARONEY
Special Services Director, AMA

Thank you, Carl, for your informative letter clarifying the important question of liability coverage for clubs and property owners. All modelers take note: in 1991, homeowner's or rental insurance that covers modeling activities will be a must!

TA

WARTHOG REVISITED

I noted with interest the request from Keith Wilson (in the January '91 issue) for information on a scale model of the A-10 Warthog. I offer a kit for this plane (see photo), and I hope you can pass the word to Keith. This kit has a wingspan of 72 inches and a length of 66

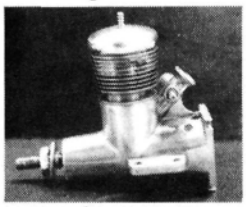
(Continued on page 10)

AIRWAVES

inches, and it's powered by two OPS .80 engines and two Dynamax fans. Its weight, fully loaded, is 23 pounds. For more information, contact Ralph's Designs, 4572 N. Woodson, Fresno, CA, 93705. Thanks for your assistance.

RALPH SALVADAR
Fresno, CA

Thanks for letting us know, Ralph. Would-be Warthog modelers will also be interested to know we've uncovered two other manufacturers of A-10s: Custom R/C, 1140 Civic Center Dr., Rohnert Park, CA 94928 (complete glass kit: 78-inch wingspan, 74-inch fuselage, Turbax 1 fans, .45 O.S. or K&B fan engines); and Sunset Models, P.O. Box 1944, 801 Cypress St., Susanville, CA 96130 (wooden built-up kit: impeller included for direct installation, 68.5-inch wingspan, 65-inch length, .45 to .55 standard engines). TA



MYSTERY ENGINE

Hey! You've got one great magazine! I've read it every month for about 3 years. "Hints & Kinks" is fantastic, and there are lots of maintenance tips that have helped me a lot.

Here's my problem: about 10 years ago, at a junk yard, I found this engine lying in some scraps of metal. A few weeks ago, I gave it to a friend for a complete cleaning. He hooked it up to an engine stand and, to our surprise, it ran like a champ! It has great compression, but what engine is it? Can any of your readers identify it from the photo? Its measurements are: height 2 3/8 inches; length 2 3/4 inches; width at rear of crankcase 15/16 inch, at motor mounts, 1 3/8 inches.

HARRY R. DEBRAY
Aberdeen, SD

Harry, we show one of your photographs in the hope that our readers can help with your enquiry. We'll send all correspondence received on this subject to you. TA

PLANE ANSWERS TO A STICKY QUESTION

A letter published in the readers' mail section of some other model airplane publications contains inaccuracies with regard to the safety of CA adhesives. Research indicates these inaccuracies were the result of referring to chemicals other than those actually in CAs. We think these reports may have misled readers and caused them undue concern.

Fact 1: CAs aren't carcinogenic. Many reputable sources and regulatory agencies continuously monitor the safety of CAs. These sources hold CAs to be non-carcinogenic. Internal and external experimental medical procedures currently use CAs for suture-less surgery on eyes, livers, brains, gums, faces, etc.

Fact 2: CAs don't emit detectable levels of hydrogen cyanide gas when heated. CAs can be softened by heating to 300 degrees F, but they produce no emissions. Continued heating to 1,000 F, which will burn the polymer, gives off the same basic fumes as those emitted during the decomposition of other carbon-containing substances, e.g., wood or gasoline (a carcinogen). Such fumes—carbon monoxide, carbon dioxide and nitrogen oxides—should be treated with respect, because they may be harmful when inhaled.

As industry leaders, Pacer Technology and the Zap Gang are very sensitive to the needs and well-being of our customers and fellow model-

ers. Because we are personally involved in modeling, we continually strive to offer and promote safe, high-quality products.

FRANK TIANO
for Pacer Technology; Frank Tiano Enterprises; House of Balsa; Robart Manufacturing

We felt this letter would be of interest to our readers, although the views expressed are exclusively those of the author. (We aren't experts on toxicity!) TA

MISSING MUSTANG

In November '89, I responded to an advertisement put out by Warbirds (122 Naubuc Ave. [NAP Bldg.], Glastonbury, CT 06033), and I sent them $6,500 for a kitted, all-aluminum P-51 Mustang, which never arrived. The kit was to come complete with six engines and a Futaba PCM radio and servos. In particular, I dealt with a Gary Laverack by phone and via the mail. Repeated subsequent letters, faxes and phone calls have failed to raise a response. I would be very grateful if any reader would provide me with a means of contacting Warbirds and in particular, Gary Laverack!

REG HARRIS
Harare, Zimbabwe

Reg, we've received several similar letters, but have no clue as to what happened to Warbirds or Gary Laverack. If any of our readers can provide any information, we'll pass it on to you. TA

(Continued on page 93)

BUILDING

MODEL AIRPLANES

by JOE WAGNER

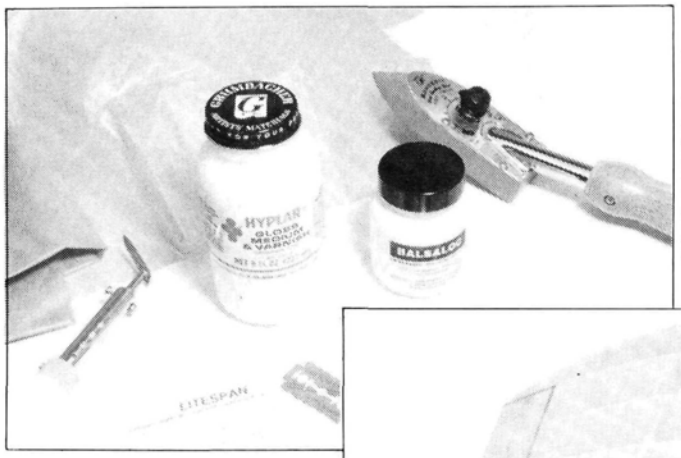
Covering film news

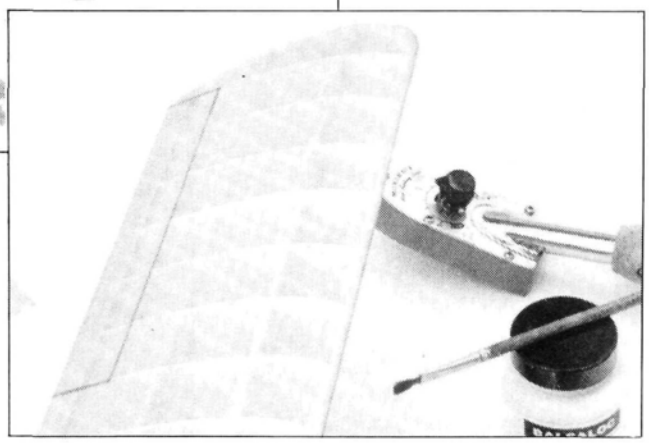
THERE ARE MORE than a dozen types of iron-on covering for model airplanes, and each has its advantages. All are fairly easy to work with, and they come with directions that tell you precisely how to apply them. That's why I haven't mentioned these materials before in this column.

Now, there's an unusual new iron-on called "LiteSpan." Made in England by Solarfilm, LiteSpan is thin (only half as thick as a human hair), light (less than 1 ounce per square yard) and tough. Best of all, an airplane covered with LiteSpan doesn't resemble a factory-made ARF; it looks as if it were hand-finished with Japanese tissue. The surface has a semi-gloss that's translucent enough to show off your model's underlying structure.

The absence of adhesive coating is what makes this material so light. As with Coverite's* Micafilm, you have to brush a coat of liquid adhesive onto all the areas to be covered. When it has dried (this takes about a half an hour), you can iron the material into place in the usual way.

LiteSpan's adhesive—Balsaloc—is water-based. Unlike the toluene-thinned Balsarite that Coverite recommends for use with its Micafilm, Balsaloc produces no toxic or flammable fumes—but it adheres just as well!





• *Left: The necessary tools. LiteSpan doesn't come on rolls; instead, it's folded, as shown in the left background.*
• *Below: An iron-on covering that doesn't look like one, LiteSpan resembles tissue in its translucency, texture, lightness and inelasticity after shrinking.*

HOW TO USE IT

Each 19½x36-inch LiteSpan sheet comes with complete instructions. One important point is worth emphasizing: LiteSpan's adhesive melts at a lower temperature than you need to shrink the material, and this requires a special shrinking technique to avoid loosening the film's edges.

You can't tauten LiteSpan safely with a hot air gun, so use a heat iron instead. Set it at a higher temperature than you'd use for sealing, and slowly and gently slide it over the surface. It's OK to go briefly to the inner edges of built-up surfaces; the wood dissipates enough heat so that the film's edges won't pull loose.

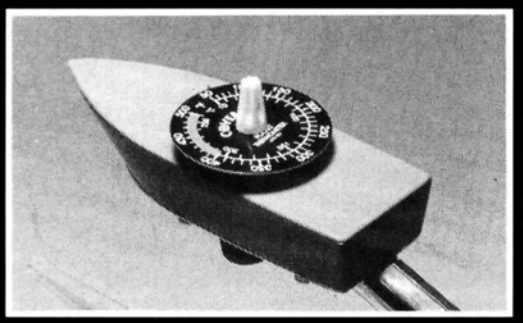
LiteSpan feels different from most iron-ons: it's crisp and inelastic. Like the Japanese tissue it resembles, it's

SHARP ADVICE

Inexpensive woodworking tools like these are fine for carpentry and cabinetmaking, but not for shaping balsa—they're not sharp enough.

Discount and variety stores carry all sorts of inexpensive woodworking tools, and you might be tempted to add them to your modeling workshops. Unfortunately, tools like Stanley's Surforms and Japanese wood rasps made from interlocked hacksaw blades *don't work well on balsa.*

Balsa requires *sharp* cutting edges; the inexpensive tools intended for shaping lumber plow grooves in it, instead of slicing cleanly through it. Remember: buy tools designed *specifically* for cutting balsa or doing work that's just as precise, and keep them sharp!



With Coverite's Pocket Thermometer, you can set your iron to exactly the right temperature for any heat-shrink covering.

Pocket Thermometer

To achieve the best results with any iron-on covering, your iron's temperature setting must be accurate. It isn't nearly precise enough to put a scrap of plastic on the iron's sole and watch what happens! Coverite's inexpensive Pocket Thermometer works nicely, though.

This little instrument is accurate and convenient, and it even comes with a list of the recommended application temperatures for all the popular brands of plastic covering.

According to the instructions, you can also use the Pocket Thermometer to check engine-head temperature, but I don't recommend this! First, you won't get an accurate reading, because the propeller slipstream interferes with heat transfer from the engine head to the thermometer's sensing element. More important, handling a small, loose device like the Pocket Thermometer near a model engine's fast-spinning prop is *dangerous*.

noticeably smoother on one side than on the other (but both sides adhere equally well.)

If you prefer a less translucent look than that of LiteSpan's four tissue-style colors (red, yellow, blue and orange), you can easily paint it. It also comes in several opaque hues: white, black and silver—plus the pale buff and dark olive green commonly used on the WW I aircraft of the British Royal Flying Corps.

I know of two mail-order sources for LiteSpan: Charlie's R/C Goodies* on the West Coast and Idealair Models* on the East Coast. (Idealair sells to both U.S. and Canadian modelers.)

THAT'S NOT ALL

The techniques used for applying LiteSpan—including the water-thinned adhesive—work just as well for Micafilm. You don't even need genuine Balsaloc. As far as I can tell, Artist's Gloss Acrylic Medium is the same thing, and it's available at art-supply stores.

This acrylic adhesive has another advantage: it won't harm foam plastic. You can safely use Balsaloc (or Gloss Medium) to cover a foam wing with either LiteSpan or Micafilm. For a strong bond, a porous, "wire-cut" foam wing might require two coats, but a single application works fine on molded foam like that used in the wings of small model planes made by Sig and Ace R/C.

**Here are the addresses of the companies mentioned in this article:*
***Coverite,** 420 Babylon Rd., Horsham, PA 19044.*
***Charlie's R/C Goodies,** 2828 Cochran St., Suite 281, Simi Valley, CA 93065.*
***Idealair Models,** 21 Simcoe Road 10, Alliston, Ontario, Canada L0M 1A0.* ■

FIFTY YEARS AGO

ANTICIPATING THE CALL TO WAR

by BRENDA J. CASEY

WE CALLED IT a "slashing monster from Mars"; the rest of the world called it the Martin Marauder, and it was the subject of our March 1941 cover story. The high-wing B-26 was specially designed to meet the war-proven need for a fast, deadly, long-range attack bomber. Powered by two 1,850hp Pratt & Whitney engines, it had a top speed of more than 400mph and a range of 2,450 miles. The plane's gross weight was 26,625 pounds, 2,460 of which was bombs.

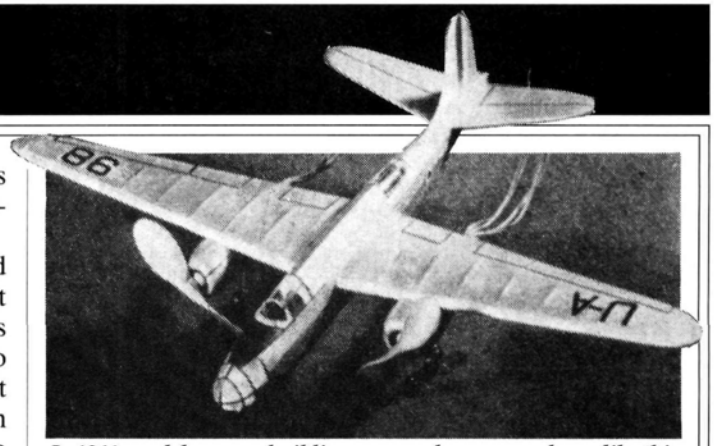
For production simplicity, the B-26 had a three-section fuselage with a perfectly round cross-section. (There were plans to develop a model with a pressurized cabin for extreme high-altitude combat.) The designers incorporated what they learned from wartime service reports, too. To improve performance, the B-26's engines were supercharged by gear-driven blowers so they could accommodate ejector exhausts. The plane's main armament was a power-driven, multi-gun, rear upper turret that was based on the successful British RAF design.

The Martin B-26 also had some innovative features. It was the first U.S. Air Corps service ship in 10 years to have a four-blade prop, and it was the first production model with prop sleeves. To enhance safety, the plane also had self-sealing rubber fuel compartments and armor plating, which was as light as aluminum, yet bulletproof.

"TOUCHY" SHELLS AND PUDDLE STOMPING!

In 1941, development continued of new aerial cannon shells that were so sensitive that they'd explode with very little contact, e.g., just by passing through the fabric on a plane's tail surfaces. In "Frontiers," we announced other aviation advances, such as the first launching of the U.S.'s seventh aircraft carrier—the Hornet. *MAN* also reported the birth of a new aviation field: the design and manufacture of transport planes (with 250-foot wingspans) to carry tanks and other equipment overseas in case of war.

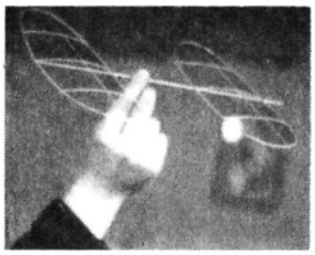
"Flash News" reported "one of the most miraculous feats in naval aviation." In the remote cow country of southwestern Texas, Lieutenant Murray Hanson landed his giant Consolidated PBY flying boat—undamaged—in a puddle that was only 3 inches deep and 40 yards long! Other PBY flying boats were now routinely making the 3,000-mile, non-stop trip from San Diego to Honolulu.



In 1941, modelers were building more and more warplanes like this Douglas DB-7.

AN EASY GLIDER

What endurance model didn't need dihedral or rudder?; wasn't thrown into the air, but rather held level at 6 feet and released?; and could stay aloft for 50 seconds?—the microfilm glider! Easy to build and perfectly balanced, it was really two planes on a stick, and its wing and tail were identical in shape. You could fly it anywhere, although 70- to 90-degree rooms with no air currents were best. Finally, a glider whose performance depended more on building skill than brawn!



If, like most modelers in 1941, you preferred warplanes, you could have built a scale model of the Douglas DB-7 twin-engine bomber. Weighing a mere 2 ounces, it was speedy and stable because of its large tail surfaces and stabilizer dihedral. To eliminate torque, its two high-pitch props rotated in opposite directions. The model DB-7 took off "like no bomber ever did," climbed at an amazing angle and then performed a neat, fast glide. Landings were great, too; it just seemed to slide in on its tricycle landing gear.

As usual, the contributors to "Gas Lines/Air Ways" didn't need any suggestions of what to build; they devised creative projects all on their own. Donald Armstrong of Fairmont, MN, built a 1/16-scale dummy model of a twin-row P&W Wasp Jr. Made of balsa, plaster of Paris and about 6 feet of wire, its diameter was less than 3 inches. With more than 300,000 parts, it's no wonder it took 150 hours to build!

The future of America's aerial defense. It wasn't easy being a "dodo"!

HELP WANTED!

In his Editorial, Charles Hampson Grant put out the call for skilled aviation me-

(Continued on page 113)

AIR SCOOP

by CHRIS CHIANELLI

New products or people behind the scenes—my sources have been put on alert to get the scoop! In this column, you'll find news that will, at times, cause consternation, and telepathic insults will probably be launched in my general direction! But who cares?—it's you, the reader, who matters most! I spy for those who fly!

In-Flight REFUELING

At a fun fly on October 28, 1990, a 60-size Schluter Champion helicopter, modified with an additional fuel tank and an onboard alternator, was flown—non-stop!—for 10 hours, 10 minutes by members of the Orange County Radio Control Helicopter Association. The proceeds from this activity were donated to the Orange County Childrens' Foundation. The helicopter was refueled in flight with a 10-foot fuel line, and 5½ gallons were used. The model was decorated with the names of the many sponsors who helped to make the event a success.

The latest addition to the Saito line of 4-stroke engines is the FA-.60T Twin. Like the larger Saito FA-.270T and FA-.300T engines, the FA-.60T features a double-journal crankshaft. Unlike the old Saito .90 twin, this engine won't suffer from horrific vibration problems. In the old Saito .90, the conrods shared the same journal, and the weight of both pistons and conrod assemblies working together led to a balancing problem. Now, like its bigger brothers, the FA-.60T's piston and conrod assemblies operate in a diametrically opposed way, thus cancelling the effect of each other's weight, like flat twins were intended to. This little jewel incorporates ABC piston/cylinder configuration and a single carburetor for easy adjustments.

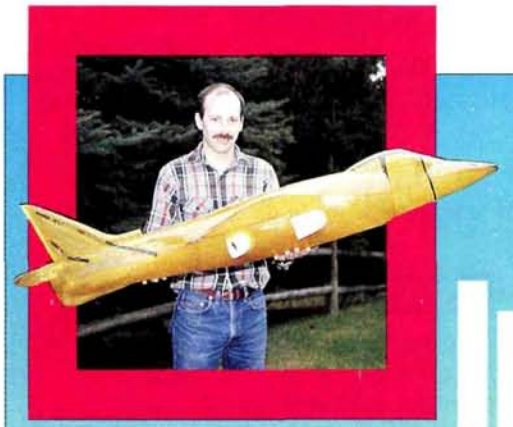
SAITO FA-.60T Twin

The reported UFO sightings at the 129-mile marker on Route 12 just outside Slippery Bone, MT, turned out to be nothing more than an elaborate deception on the part of Dinwitty Farquar of Slippery Bone. It seems that, to go flying more frequently, Dinwitty had told his wife Lora Lee that he was working on an R/C steam iron and that the project was running behind schedule. Nobody's fool, Lora Lee showed up at the flying field with the freshly washed, wrinkled bed sheets and expected some performance since the project was already nine months old. Dinwitty tried to pass off the oil spots left by low "ironing" passes as steam droplets, but Lora Lee hung him out to dry.

PHOTO BY DE WEERDT LUCAS

AN EXTRA EXTRA

It seems that everybody is "Extra" crazy these days. For those who fall into this category, here's a larger Extra—or an Extra larger!—from the EZ line of high-quality ARFs. The only information available at this time is that the model calls for a 60 2-stroke or 90 4-stroke, which means the wing area should be approximately 600 square inches. This is all the information I have; I don't know whether the kit will ever be imported, but, like many of you, I sure hope it is.



Dr. Invento

Russ Pribanic of New Milford, CT, is scratch-building a ducted-fan B-Model Harrier jump jet based on military color-scheme blueprints and dimensions taken from a Revell kit. Its wingspan will be 48 inches and its length, 65 inches, and it's projected weight is 8 pounds. The fuselage's exterior is made of glass-cloth impregnated with Safe-T-Epoxy, and the interior duct work is of polyester resin. A K&B .72 or an .82 DF will be mounted in a Violett fan unit. Carbon-fiber-reinforced composite bulkheads will be used, and Russ has already built and tested a CO_2-powered puffer jet system for roll control in hover.

Another of Russ's projects is a miniature, 2.5-ounce turbocharger designed for the Enya 60 4-stroke. Russ used an electro-discharge machine (edm) to build the turbine impeller blades. Using compressed air, the unit turns 100,000rpm and provides a 4psi boost at the carb intake. The exhaust pressure from the Enya has yet to produce the required 100,000rpm, and the unit is still being tested. I'll keep you posted on these and other projects from America's backyard geniuses.

PILOT PROJECTS

A LOOK AT WHAT OUR READERS ARE DOING!

SEND IN YOUR SNAPSHOTS!

MAN is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable.

All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of 1991. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!

Send those pictures to:
Pilot Projects, Model Airplane News, 251 Danbury Rd., Wilton, CT 06897.

FIRST BIG BIRD

This 90-inch span Ercoupe is the work of Rich Sadler of St. Louis, MO. From the Jim Messer kit, it has a Quadra 42 for power and a Futaba radio for control. It weighs 18½ pounds and is finished with Sig Koverall and Sherman Williams household paint. Jim says it flies beautifully with an 18x6 prop.

SUPER CHARGER

This 1/4-scale Walt Moucha kit of the Marquart Charger is by Neal Lowell of Sacramento, CA. Powered by a 3.2 Sachs engine with electronic ignition timing, the 20-pound Charger is controlled by an Airtronics Vision radio and finished with Solartex and K&B SuperPoxy paint. This is Neal's first 1/4-scaler.

This huge model "Herk" is the work of Jos Dubois, from Maasmechen, Belgium. Its wingspan measures 6 meters and its tail is 2 meters high! It's powered by four Titan 38cc gas engines. Mr. Dubois has been flying it at airshows since 1986. It takes off in approximately 30 feet, and when he flies it "low and slow" (at 60 feet), it's a hit.

BIG BELGIUM HERCULES

CAD SKINK

This rather unusual club pylon racer was designed and built by Vance Dunlop of Troutdale, OR. Vance used an auto-CAD program to calculate its dimensions and filled in the rest by hand. The 36-inch model has a 36 1/2-inch span and is powered by a K&B Sportster .20. Three channels control canard/elevon, elevon and throttle. (In the photograph, Beth Ann Dunlop holds the Skink.)

FAR OUT PHAETON II

Built from a Balsa USA kit, this nicely finished bipe is the work of Jon Barnes of Akron, OH. The Phaeton II is powered by a K&B 61 2-stroke engine, has Futaba brains and is finished in Worldtex with Sig Formula-U paint. The model took 18 months to build, and when Jon has tuned its receiver to meet 1991 specs, he'll test-fly it.

EXCELLENT ELDER

This nice-looking Top Flight Elder 40 is the work of Bob Dentinger of Colgate, WI. Finished in red MonoKote, its Iron Cross markings are of black aerospan. Its open-frame section was extended by one bay, and it's nicely finished and stained. Flaperons allow super-slow flight at one-third throttle. Bob uses an SP 7P Airtronics radio for control. The machine-gun barrels are equipped with small strobe lights that simulate gunfire!

BLAST FROM THE PAST

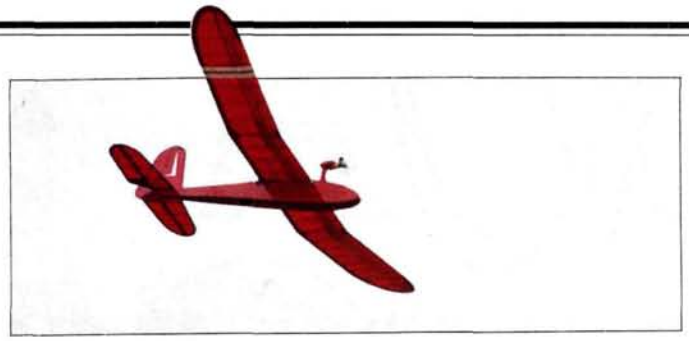
Steve Parker of Port Jarvis, NY, has been collecting copies of *MAN* for more than 30 years, and he occasionally leafs through them for something old to add spice to his modeling. This time, it's the Little Red Twin from the October '62 issue. This 58-inch-top-span beauty is powered by an O.S. .25 FP and weighs 5 pounds ready to go. Steve says that he scaled the design up a bit and it flies very well on three channels.

ROCKIN' RAM JET

This scale model of the French 1957 Leduc 022 ram jet is the work of Edward Hess of Molalla, OR. The model has a wingspan of 49 inches, it's 74 inches long, and it weighs 13 pounds. It's powered by a Bob Violett ducted fan that's coupled with a K&B .82. Ed took 18 months to scratch-build the Leduc from his own plans, and it's now being readied for its first test flight. Good luck, Ed!

Y'NOT

by RANDY RANDOLPH



IT'S A HAND-LAUNCHED glider, a high-start-launched sailplane, or an .020-powered Sunday flier. The Y'Not is as versatile as you can get from a 2-channel radio system. Granted, it's neither the best hand-launched R/C glider in the world, nor is it a crackerjack sailplane, but it's small enough to be thrown high enough to reach thermals, and it's light enough to soar in very gentle lift. As for being a .020-powered sport flier, its bag of tricks includes loops and stalls and, with some luck, a ride on a thermal now and then. If the grass is short, soft and dry, Y'Not will even take off with just the slightest shove.

The Y'Not is a "Jack of all trades and master of none," but like "3-in-1 Oil," it sure is handy to have around!

Hand-launch, high-start, or power this one with an .020!

PHOTOS BY RANDY RANDOLPH

Y'NOT

CONSTRUCTION

The identical ribs can be cut at the same time: stack 1/16-inch blanks and use a band saw to cut them out. You could also make a template and cut each one individually out of 3-inch wide sheet. The two tip ribs are cut to length, glued into place then sanded to blend with the tip. The four ribs at the center have extra notches to receive the false spars that are used instead of sheeting.

You can strip the spars or buy them. The top and bottom main spars should be of fairly firm wood, but you can use medium-hard wood for the leading edge and the other spars. To ensure a strong, solid joint with the ribs, notch the trailing edge at 2-inch intervals. Slice the tips out of soft, 3/16-inch wood with the grain running lengthwise. Make eight dihedral braces out of 1/32-inch plywood.

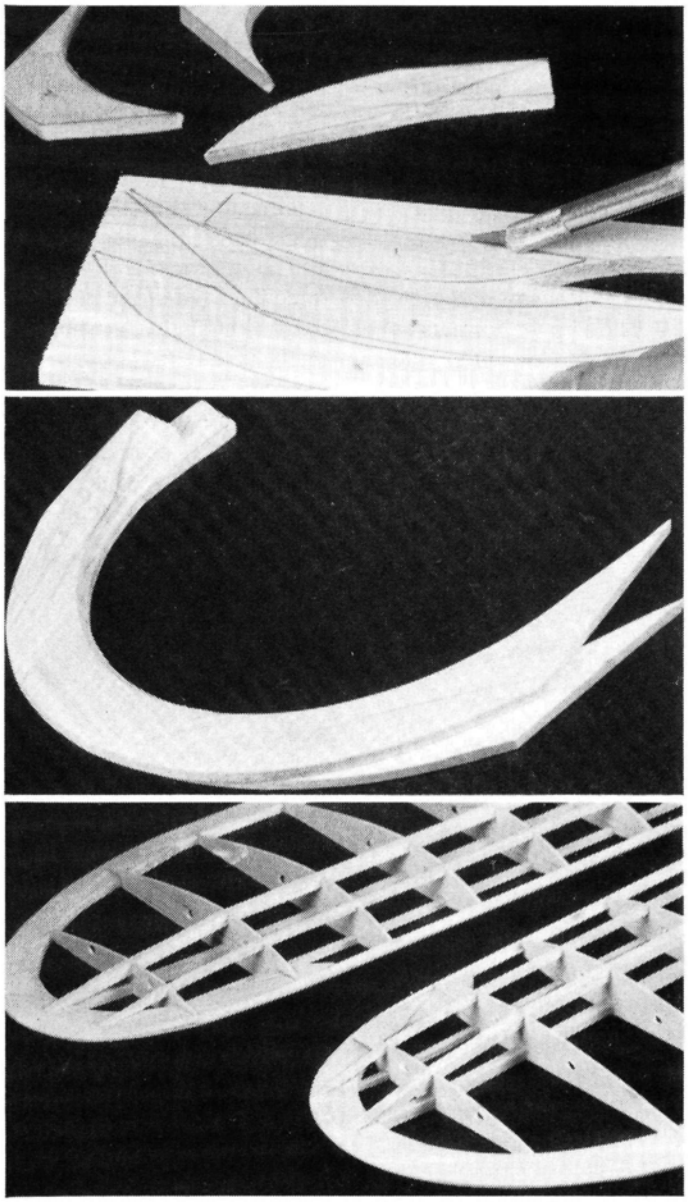
Like most built-up wings, the Y'Not's are built right over the plan. Start with the center panel: pin the trailing edge and the bottom main spar into place and add the ribs. Make a dihedral gauge out of scrap wood, and use it to set all the end ribs to the proper angle on the spar and trailing edge. When you've assembled the ribs, add the webs to the center and the top main spar, the top leading-edge spar and the leading edge. Notch the center ribs for the false spars. When you've removed the panel from the plan, add the bottom leading-edge spar and the false spars.

Build the tip panels in the same way, again using the dihedral gauge on the end ribs. Glue the tip bows over the plan, and insert them between the leading and trailing edges. Notch them at the trailing edge to receive the tip rib. Trim the tip rib to fit between the leading edge and the trailing edge, and glue it into its notch in the bow, then sand the top to conform to the airfoil's shape. Deepen the spar notches so that the spars are flush with the top of the rib. Butt the top spars against the tip bows, and when the glue has set, taper and sand the bows to a knife-edge that blends into the leading edge.

When you've completed all three panels, sand the spar ends and trailing edges to match the dihedral angle set in the end ribs. Pin the center panel onto the bench. Elevate the two outer panels so that the tips are 4 1/4 inches above the bench, and join them to the center panel. Widen the main spar notches in the ribs with a single-edge razor blade, and insert the top dihedral braces on both sides of the top main spar. When the glue has set, take the wing off the bench, add the bottom dihedral braces to the bottom main spar, and sand the completed wing. Strengthen the center of the trailing edge (where the rubber bands that hold the wing on will go) by adding a 4-inch piece of 1/32-inch music wire to the area.

The stab-elevator and fin-rudder are built right over the plan in the same way as the wing. Cut out the curved pieces first, again with the grain running lengthwise. Build the elevator with the 1/8x14-inch spar running along its full length, and when you've completed the stab, inlay the 1/8-inch hardwood dowel carry-through into the leading edge at the center. The plywood control horns will be added after you've finished covering and hinging. Cut the sub-rubber out of 1/8-inch sheet balsa.

Cut the fuselage sides out



Above, from top to bottom:
- *Trace the tip outlines onto tissue paper, use a "stick" glue to attach the tracings to soft 3/16-inch balsa sheet, and slice around the outlines with a razor knife. Use a sanding block to true the mating edges.*
- *When they've been assembled, pin the tip bows together and sand them to the same outline. Use thick, soft wood for the tips because it warps less when the covering shrinks.*
- *Notice how the tip bows and spars are sanded to blend the leading edge into the trailing edge. The tip rib is sanded to match the taper.*

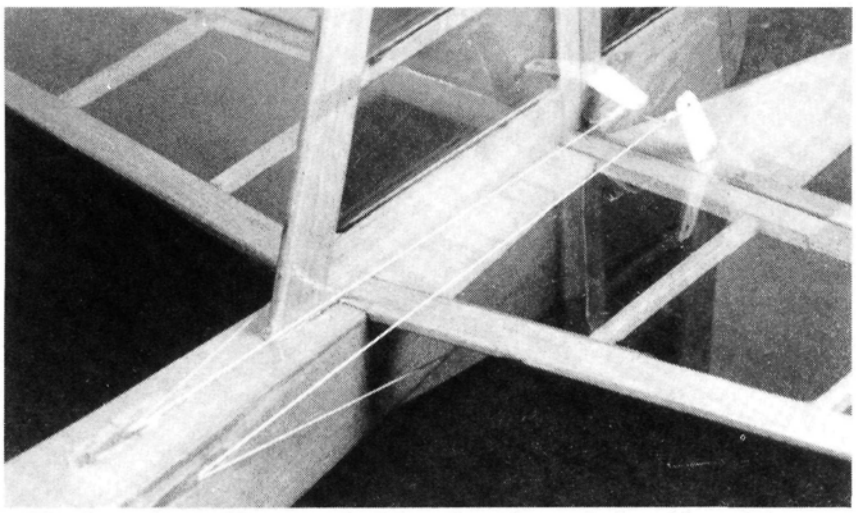
Y'NOT

of medium 3/32-inch sheet balsa, and add the 3/32-inch balsa doublers, longerons and uprights. Join the two sides and sand them to the same outline. While they're joined, drill the 3/16-inch holes for the wing-mount dowels. Carve the nose block out of soft balsa.

Build up the formers as shown, and glue them into place on one of the fuselage sides. Use a right triangle to make sure they're at a right angle to the side. Join the two sides with the formers. (Again, use a right triangle to check that they're aligned with each other.) Join the sides at the tail and bring the nose together with the nose block between them.

Glue the 1/8-inch plywood finger pad to the rear of the aft cabin former, and reinforce the front of the bulkhead with gussets, as shown on the plan. Glue another piece of 1/8-inch plywood between the fuselage sides at the tow-hook location, and add a square of 1/4-inch plywood at its center. Mount the fairlead for the elevator cables before you add the top and bottom sheeting. Drill a 1/8-inch hole where shown, and angle it toward the cabin area by sanding with a small roll of sandpaper wrapped around a piece of music wire. Glue a 1-inch length of inner Nyrod through the hole, and trim the rear end flush with the fuselage side. The Nyrod should be on a line between the cabin area and the stab's leading edge.

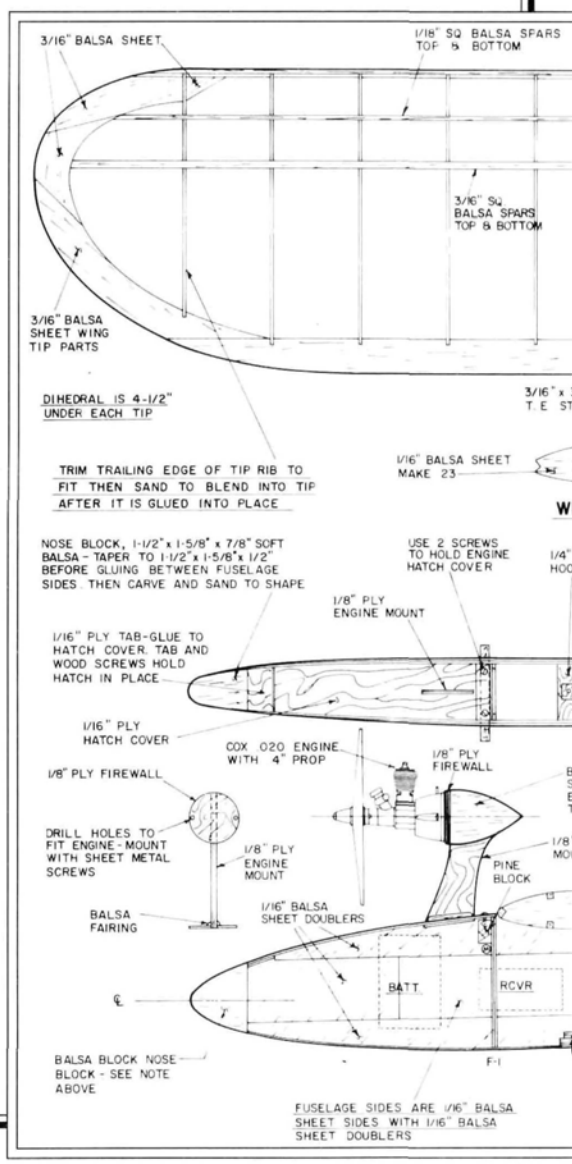
With the exception of the area from the front of the wing mount to the nose block, sheet the top and bottom of the fuselage with 1/16-inch sheet balsa (with the grain running crosswise). Cut a "finger hole" in the bottom sheeting just behind the aft cabin former. Install a second piece of inner Nyrod in the top sheeting for the rudder cable, just as before. Glue a 1-inch length of 1/4x3/8-inch hardwood to the front of the first bulkhead just above the dowel location. Glue a 1/2-inch-wide piece of 1/16-inch

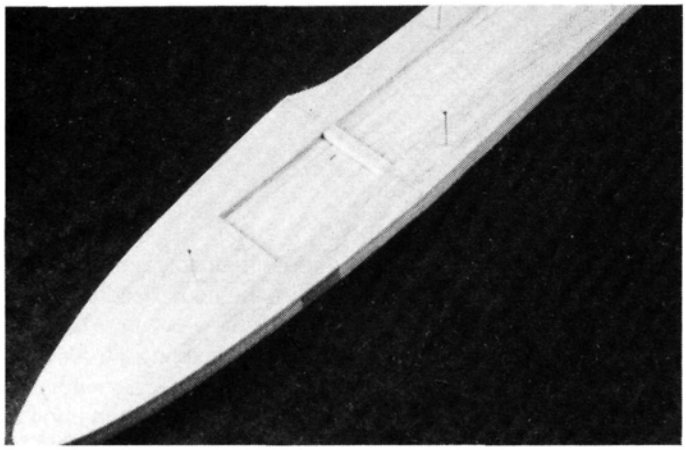


The plywood control horns are glued through notches cut in the rudder and elevator. Small pieces of 1/16-inch aluminum tubing, squeezed with pliers, anchor the 15- to 20-pound monofilament control cables at the horns.

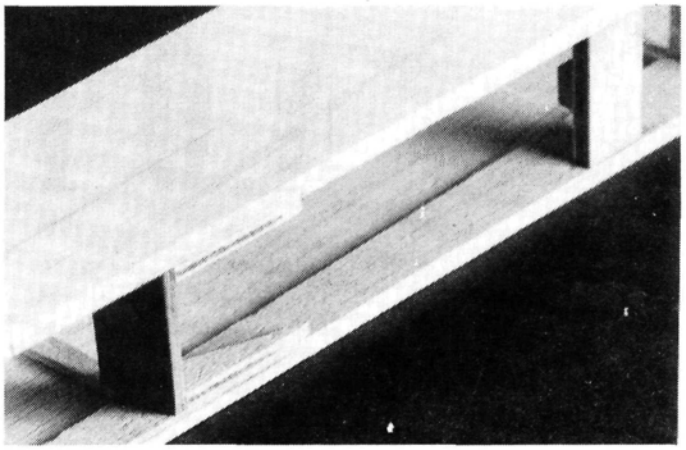
FSPO3911 Y'NOT $10.00

Designed by Randy Randolph, the Y'Not is a multi-purpose, easy-to-build sport design that can be high-started, hand-launched, or flown with a .020 engine. The model is constructed of balsa and plywood using conventional techniques. A polydihedral wing makes it very stable. It's controlled by a light pull/pull monofilament control-cable system and is a great all-around fun flier. One full-size plan sheet. WS: 47"; L: 25 1/4"; Engine (if used): .020; 2 channels (rudder and elevator). LD: 1





When the doublers and stringers are added to the fuselage sides, pin them together and sand them to the same outline. This is the best time to drill the 3/16-inch holes for the wing-mount dowels.



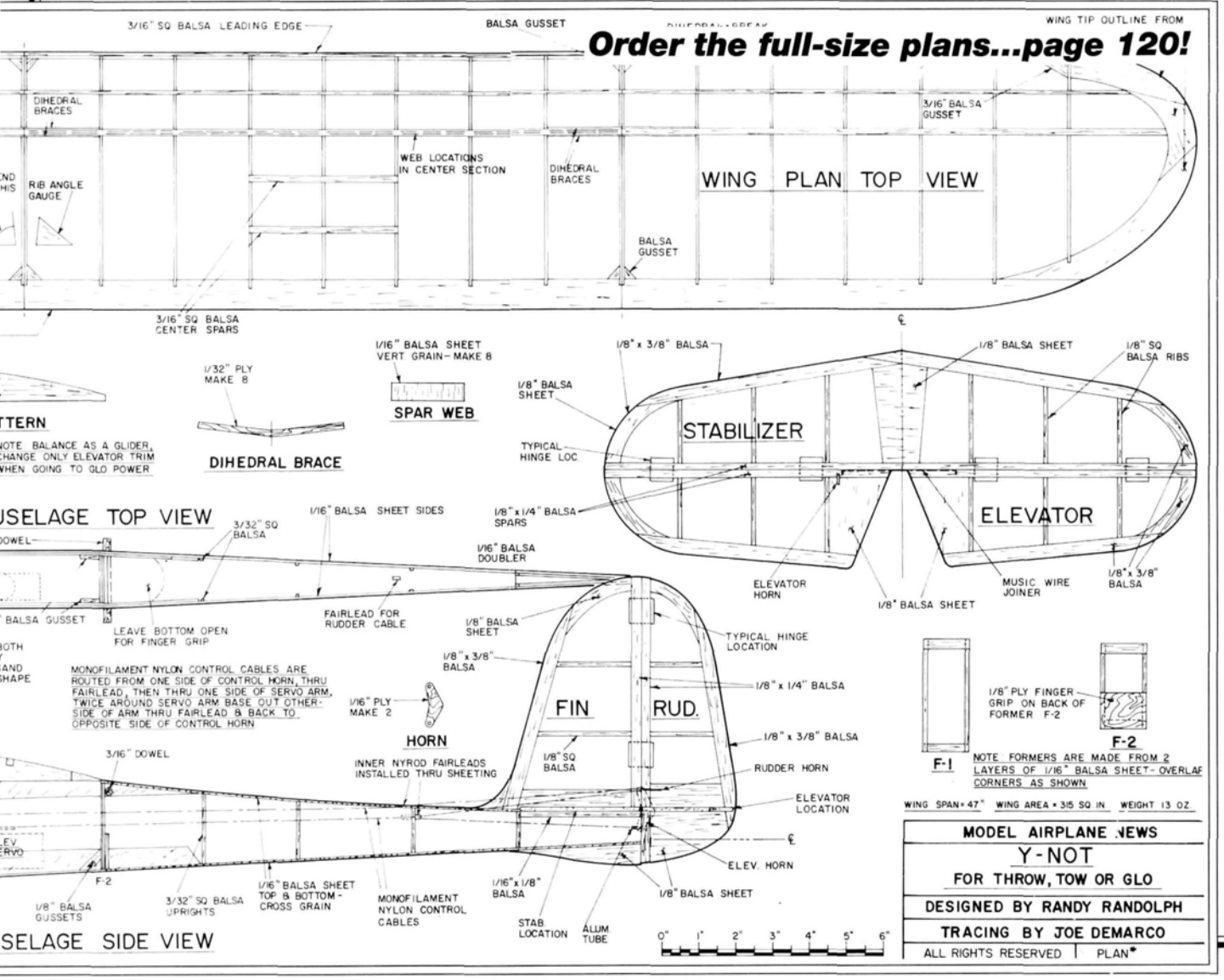
A 1/8-inch plywood piece is added to the bottom rear of the aft cabin former and reinforced with gussets to provide a finger-hold for hand-launches. Notice the ply piece (top right) that makes the tow-hook mount.

plywood across the nose and against the nose block.

Fit the wing into its saddle, and make two plywood hatch covers that fit from the nose to the wing leading edge. Glue the 1/16-inch ply tongues to the front of each, then hold them in place and mark the center of the hardwood block on each. Drill a 3/32-inch hole in the center of one to match the middle of the block. Drill two 3/32-inch holes in the other, each 1/4 inch from the center and matching the block.

The second hatch cover will form the base of the

Order the full-size plans...page 120!



Y'NOT

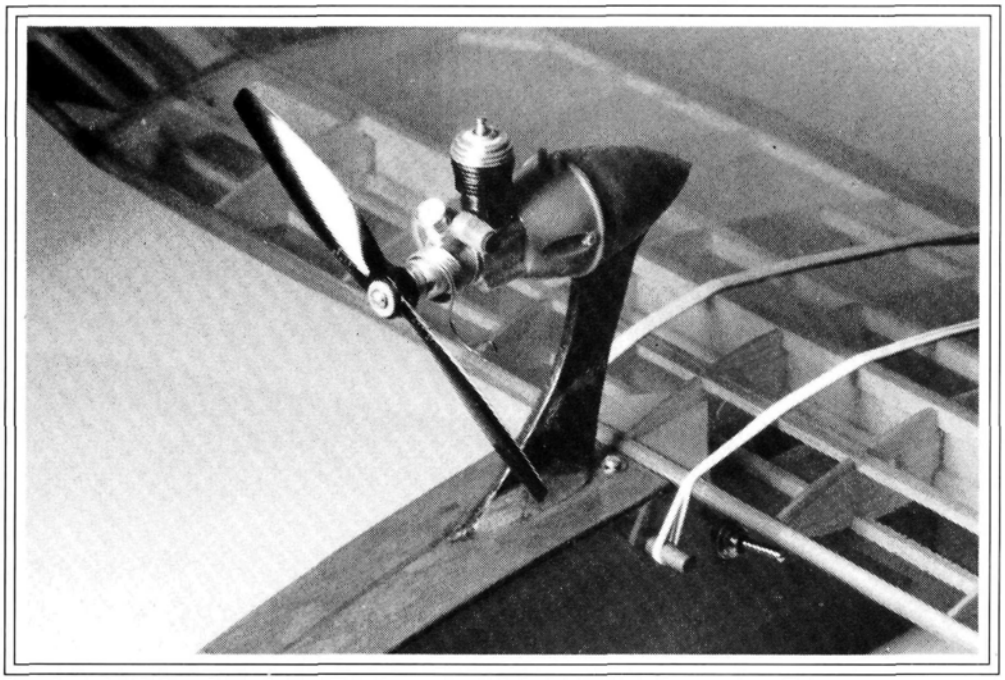
engine mount. Drill 1/16-inch holes into the hardwood block, to match those in the hatch covers; use small wood screws and washers to hold the hatch covers in place on the fuselage. Sand the completed fuselage.

To build the power pod, cut the engine-mount pylon and firewall out of 1/8-inch plywood. Drill the firewall, glue it to the front of the pylon, then add the soft balsa blocks that form the fairing. Sand the blocks to a streamlined shape, then glue the pylon to the top of the twin-holed hatch cover, and add the fairing blocks to each side. You can cover or paint the engine mount to match the rest of the airplane.

The prototype models were covered with transparent MonoKote*, but use the film you like the best. Their control surfaces used hinges made from the covering film and were very light and flexible.

When you've covered the tail surfaces, glue the plywood control horns into place (notice they go right through the rudder and elevator and form a pull/pull horn). Take the covering off the center of the stab where it touches the fuselage on the bottom and the fin on the top. Glue the fin to the top of the stab (a right triangle is a great help here), then glue the stab to the fuselage. Trim away the covering on the bottom of the fuselage, and glue the covered sub-rudder into position. Glue the 3/16-inch wing-holding dowels through the holes drilled and install the radio.

I mounted a Cox* servo on each side of the cabin, one farther forward than the other. The aft servo is slightly lower so that the control cables from the other easily pass over it. I substituted a 500mAh Ni-Cd battery pack for the battery box that came with the system, mounted it in the nose, and followed it with the receiver. With this arrangement, the balance was just where it belonged.



Cover the 1/8-inch, plywood, engine-mount pylon with film, or paint it with epoxy paint. To change to glow power, simply change hatch covers!

Here's the easiest way to hook up the cables: first, slice four 1/8-inch pieces of 1/16-inch aluminum tube; these will act like Nicopress sleeves. Cut 2 feet of sewing thread and two, 3-foot pieces of 15- or 20-pound monofilament fishing line. Find the middle of the monofilament, and push it through the fairlead that serves the elevator. Make a hook by bending a 6- or 8-inch length of light wire, and use it to fish the loop into the cabin area where it should be anchored with a piece of tape.

Tie one of the cable's loose ends to the thread and tie a knot in the other loose end to prevent it from slipping into the fairlead. Now pull the cable to which you tied the thread through the fairlead and into the cabin area above the servos. Untie the thread, run the cable through a hole in the servo arm, around the base and back up through the opposite hole. Center the loop of cable in the servo arm, pull it tight and use tape to hold it in place on top of the arm.

Again, tie the thread to the same end and pull it back through the fairlead. Turn on the transmitter, and determine which cable gives up-elevator. Slip one of the pieces of aluminum tubing over this cable, then run the cable through the top hole in the elevator arm and back through the aluminum tubing. Hold the elevator in neutral and pull the cable tight, then slide the tubing up against the horn to cinch the cable in the horn. Untie the knot in the other end of the cable, slip the tubing on, run it through the other side of the same horn and pull it up tightly as before. Adjust the cable in the horns until the elevator is at neutral, squeeze the tubing with pliers, and trim off the excess

(Continued on page 113)

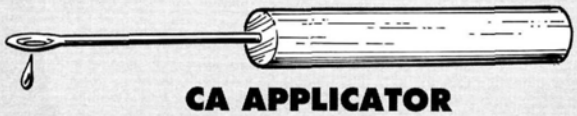
HINTS & KINKS

Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send a rough sketch to Jim Newman, c/o **Model Airplane News**, 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

by JIM NEWMAN

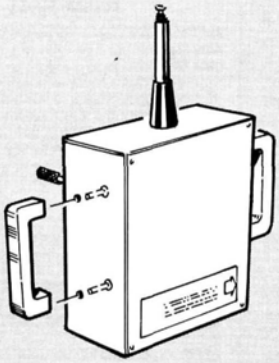
READER ALERT!

One of the tips in our November '90 "Hints & Kinks" recommends the use of a pair of empty DP propane tanks as an airbrush compressor receiver to smooth output airflow—DO NOT, UNDER ANY CIRCUMSTANCES, USE "EMPTY" PROPANE TANKS FOR THIS PURPOSE; THE TANKS ARE NEVER REALLY EMPTY, AND PROPANE IS POTENTIALLY EXPLOSIVE WHEN MIXED WITH AIR. Instead, use empty air tanks that are readily available at auto-supply stores, and make sure that they have safety valves.



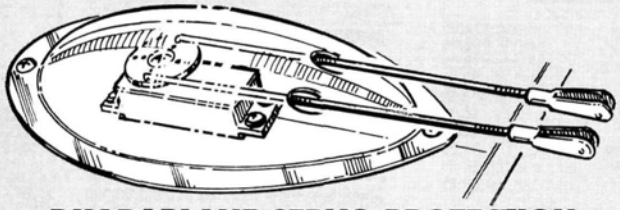
CA APPLICATOR

A needle that's pressed into a dowel makes a useful applicator for CA, and it's particularly handy when very small quantities are desired. When dipped into the CA, the eye of the needle holds only one small drop. *Larry Renger, Cerritos, CA*



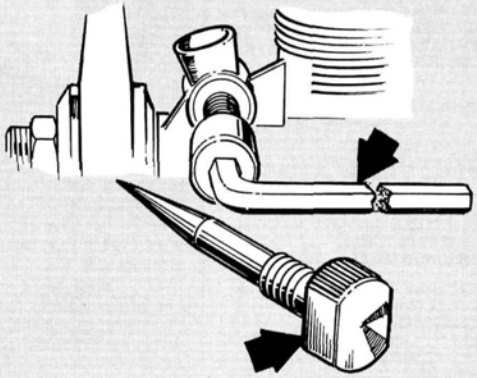
TRANSMITTER HANDLES

The handles on commercial desk drawers are typically attached with two screws that usually have hexagonal heads. Drill two holes in each end of a transmitter case (as shown), and attach a handle to each side. You'll be able to grip the case with your fingers, while your thumbs are free to operate the sticks. If you have small hands, position the handles toward the front of the case so that you won't have trouble reaching the sticks. *J. Richards, Menlo Park, CA*



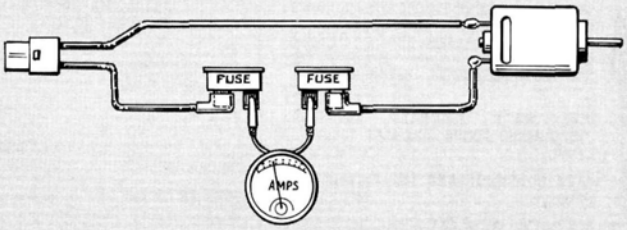
DUARAPLANE SERVO PROTECTION

When you add ailerons to a Duraplane, your servo will protrude from the wing and be subjected to dirt and exhaust residue. To protect it, cover it with a commercial bubble canopy, and let the pushrods project out of the slots in the rear of the molding.
Jeff Emminger, Valrico, FL



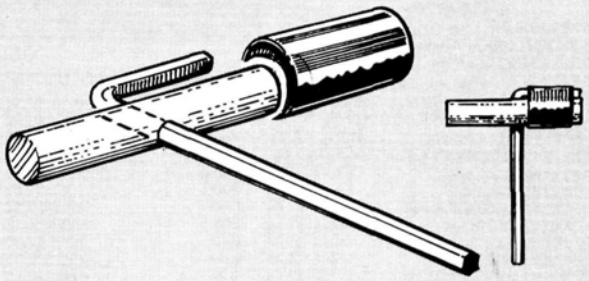
REMOTE NEEDLE-VALVE ADJUSTER

Use your Dremel Moto-tool to grind flats on the side of the needle-valve knob. You can then make adjustments with a socket wrench or a nut driver while your fingers stay clear of the propeller disc. An even better tool is a flexible-drive carburetor adjuster that allows the tool to be bent astern of the propeller disc.
John Thompson, Lewistown, MT



NO-CUT METER CIRCUIT

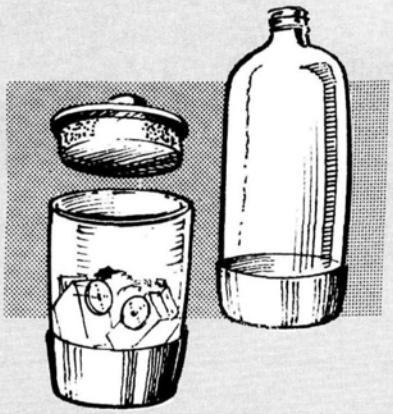
To check the current flowing through a factory-wired motor harness without cutting any wires, unplug one leg of the fuse, insert a second fuse into the now empty socket, and clip an ammeter to the bare spade terminals of the two fuses. By using matching connectors, you can also wire a speed controller into the circuit in the same way.
James C. Madsen, Fresno, CA



ALLEN-WRENCH T-HANDLES

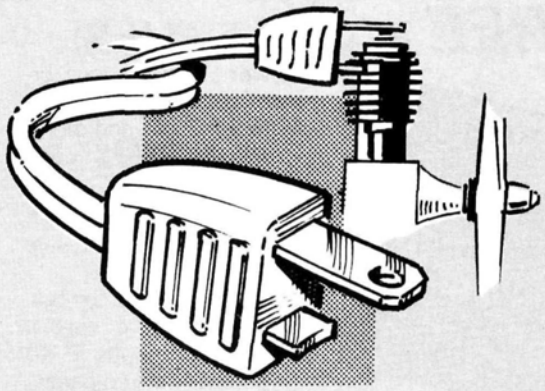
To create handy T-handles for Allen wrenches, cross-drill a 3-inch length of 5/16-inch dowel, and insert an Allen wrench through the hole. To hold the Allen wrench in place, "sleeve" the dowel with shrink-tubing. *David S. Byrd, Johnson City, TN*

HINTS & KINKS



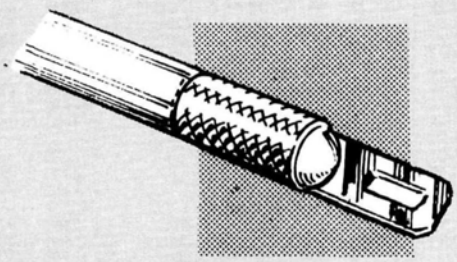
STORAGE JARS

By cutting them as shown, 2-liter soda bottles can be used as unbreakable storage jars. To keep out shop dust, make simple lids from materials like foam tile or cork.



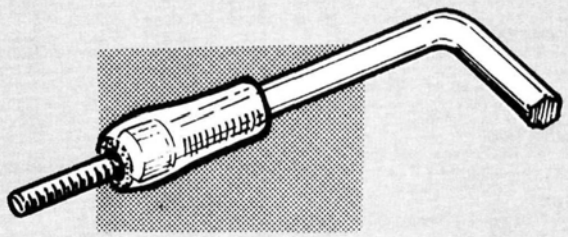
GLOW-PLUG CLIP

Power cords usually break at the receptacle end. The plug end with one prong shortened and rounded, however, makes a first-class "hang-on" glow-plug clip. The cord should be no more than 15 inches long.



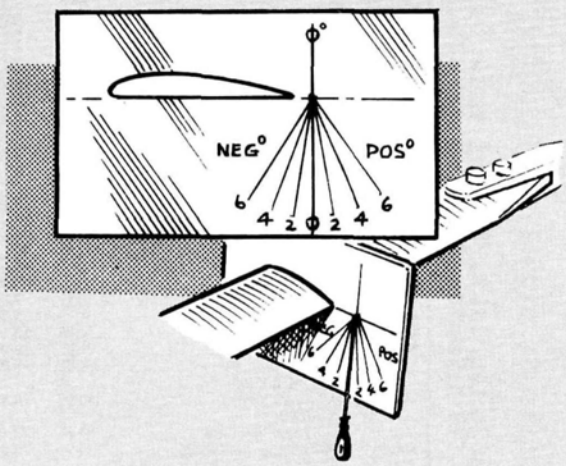
SCREWDRIVER REPLACEMENT

If you've lost your screwdriver, a modeling knife with the blade reversed in the handle may be good enough for small screws. Use this method only in an emergency.



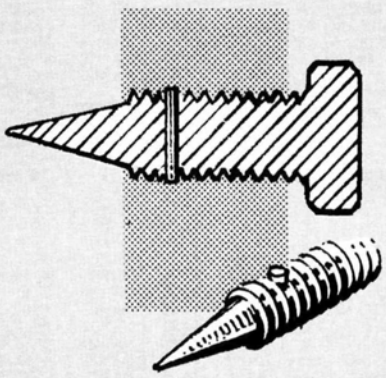
RUBBER FUEL-LINE USE

For hard-to-reach spots, use rubber fuel lines to keep screws attached to a screwdriver. This old trick also works well with Allen wrenches.



ROTOR-BLADE PITCH GAUGE

To make an inexpensive helicopter rotor-blade pitch gauge, use plastic sheet, fine nylon monofilament and a lead weight. The template must fit well to the airfoil section. Drill a hole where the graduation lines meet, and knot the monofilament through the hole.



NEEDLE-VALVE CURE

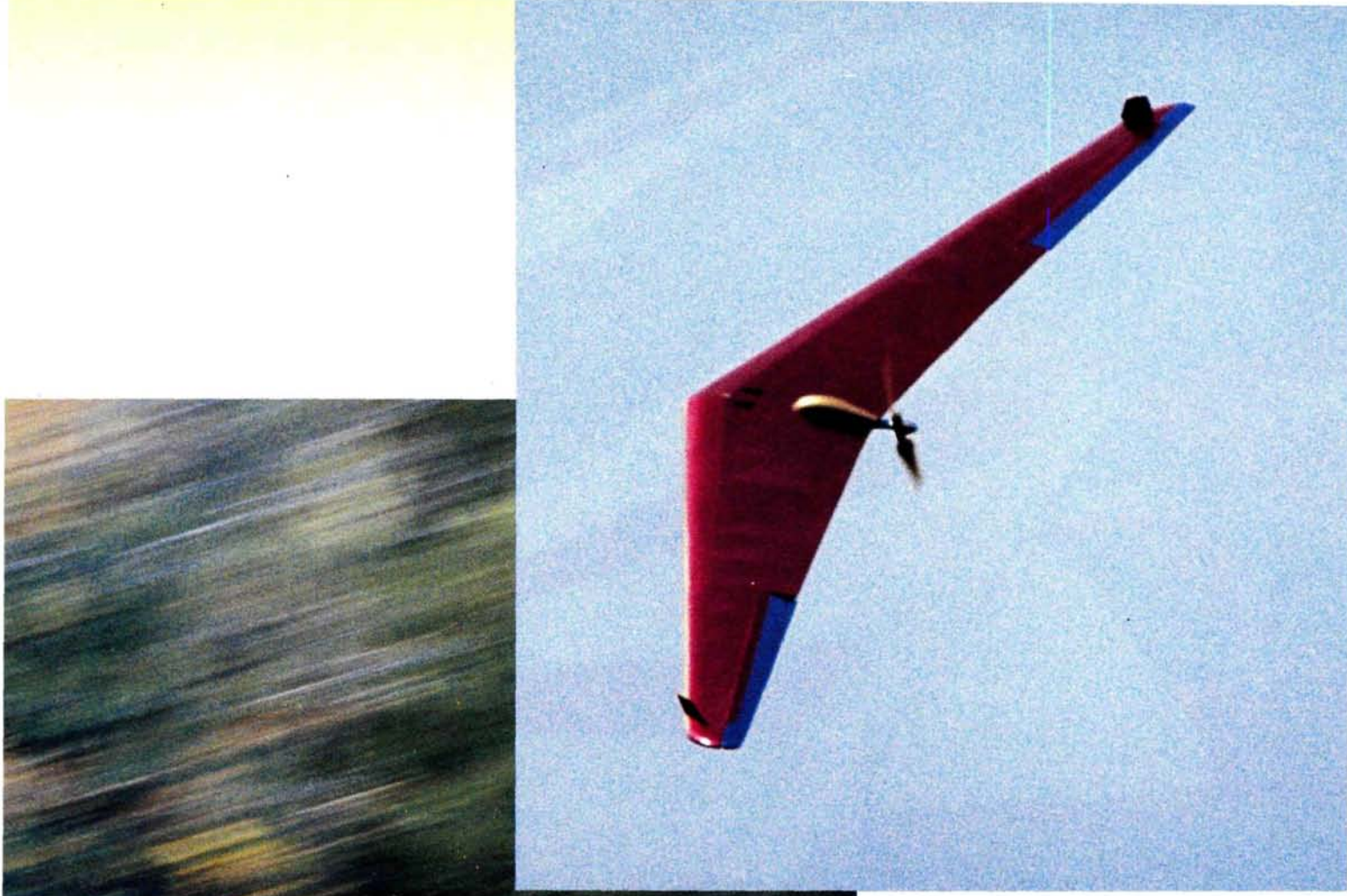
Here's a sure cure for errant needle valves—especially those on older model Perry carburetors. Drill a very small hole through the threaded part, then insert a small piece of Teflon, which should be slightly longer than the diameter of the threads. The Teflon can be cut from a CA applicator. With this, the needle will stay at the desired setting even without the spring.

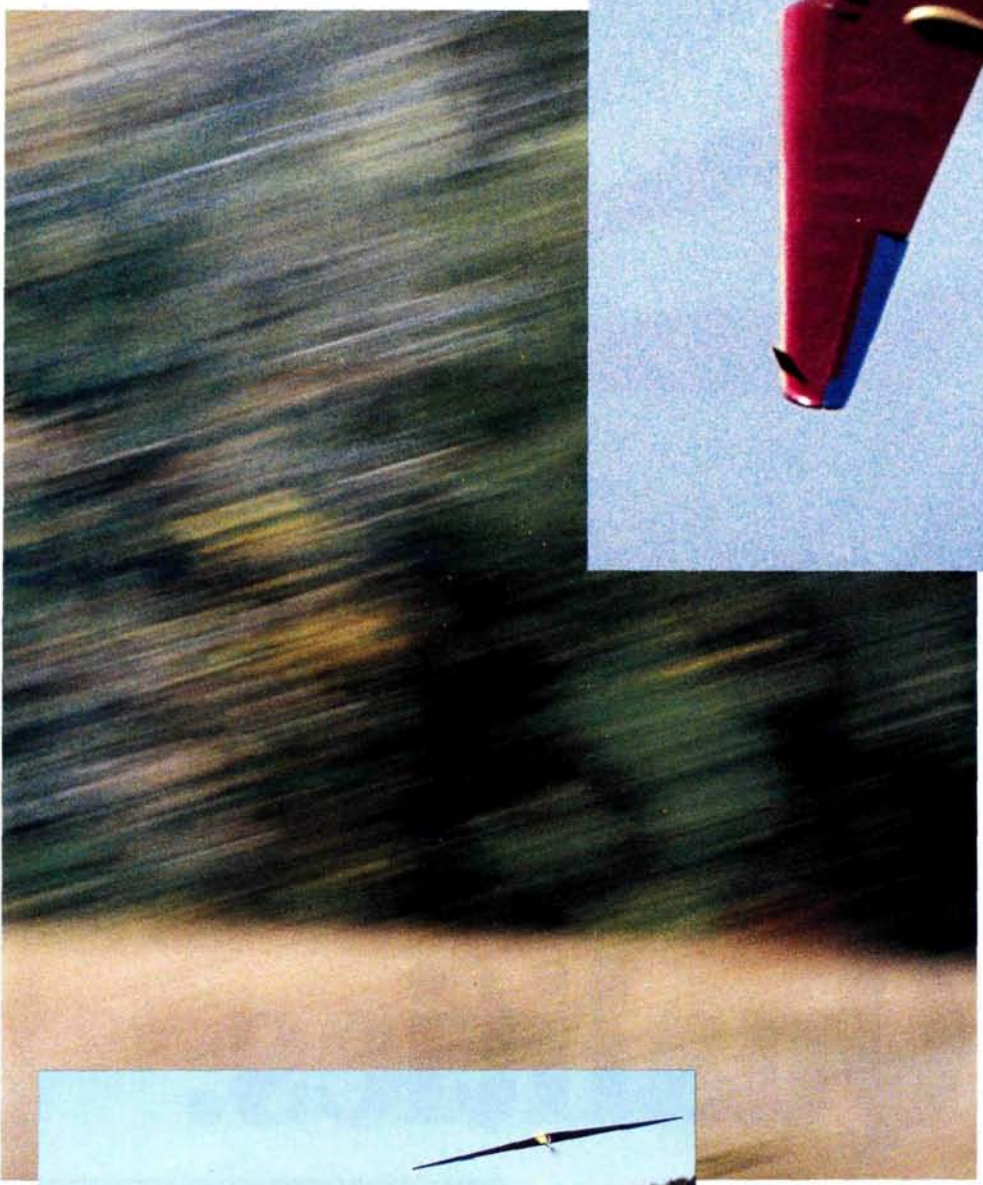
Can this sport electric outfly your glow trainer?

OPTIMIZED electric

PART II

by TOM ATWOOD





Opposite page, top left: Associate Editor Gerry Yarrish shows the top of the wing with the hatch off: the Astro 205 speed controller is visible; all the components are readily accessible. Above: The wing has excellent gliding characteristics; the prop folds behind. Left: Editor Tom Atwood at the sticks while Gerry launches.

I HAD ENVISIONED building a high-performance sport electric; my strategy was to reduce weight and drag by using a flying-wing planform. As I noted in Part I (see *MAN*, November '90), I chose the Klingberg Wing sailplane and experimented to find the best battery/motor/speed controller/prop combination. In my previous article, I described the performance of the Optimized Electric using either an Astro Flite* 035 (rated at 90 watts) or a .05 cobalt (rated at 125 watts). The 05 offered an 11-minute continuous flight at low throttle with seven 1200mAh SCR cells. At full throttle, this combination provided spunky aerobatic flight that outpaced some of the slower glow trainers at the field.

How would the plane perform with the more powerful 200W FAI 05 cobalt? Would 1700mAh SCE cells yield comparable flight times, and how much would aerobatic performance improve using more than seven cells?

I wasn't disappointed! The Optimized Electric provides unusual duration *or* aerobatic power for a .05 electric with a wingspan of more than 6 feet. Performance depends only on battery selection and your touch on the throttle.

FLUTTER CRUNCH

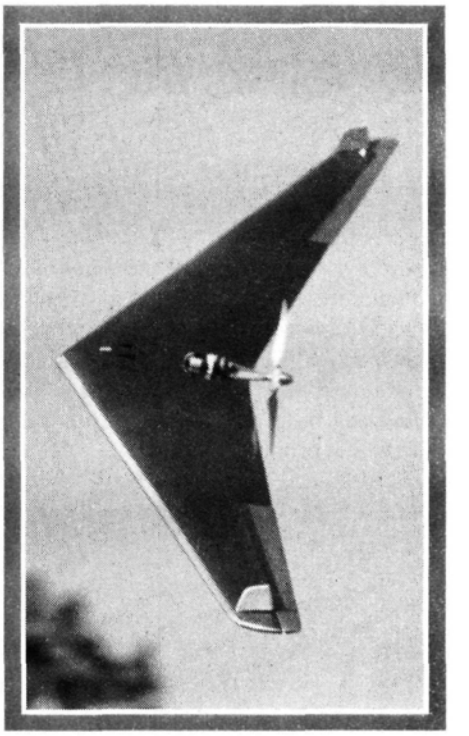
When I installed the FAI 05 cobalt, power increased noticeably, but in an early flight, flutter again raised its ugly head. In a high-speed dive, flutter took out the linkages to both elevons. "You'd better pull up-elevator," noted my friend Jim Wilson, who had often assisted me with hand-launches. "I have," I replied. A few moments later, the wing met the earth and crunched itself into toothpicks. Computer elevon mixing was a requirement if I were to take this ship the next step.

THE REBUILD

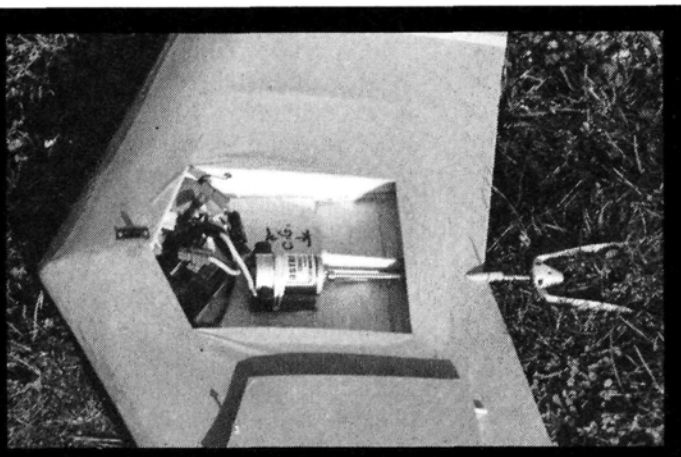
I built a new plane and chose a Hobby Dynamics* JR-X347 computer radio with two Futaba* S-133 microservos in the wings for elevon control. Initial flight tests showed a more responsive plane with improved tracking.

The telltale yawing exhibited by the wing after a stunt or when buffeted by wind remained, so I installed "free-flying winglets" (an idea suggested by designer Rollin Klingberg). These can rotate outward, but not inward past a pin that aligns them parallel with the thrust line. If the nose yaws to the left, the right wing tip sweeps forward and the winglet locks against the pin and creates drag. Meanwhile, the winglet on the trailing (left) wing tip weathervanes outward and produces far less drag (see photo). The result is a passive, anti-yaw system.

Embed one end of a piece of 1/16-inch piano wire in each winglet at 20 percent of its chord. Mount the winglet on the wing by slipping the free end of the wire into brass tubing that's trimmed flush with the wing's top and bottom. Make sure that the wire is long enough to protrude 3/16 to 1/4 inch out of the bottom of the wing. To prevent the winglets from slipping off, secure them by adding a



The passive, anti-yaw system in action: as the wing circles to the left with slight rightward yaw, the left winglet locks and the right one weathervanes. This photo was taken during a test flight with prototype winglets. (The pilot is Michael Lachowski.)



David Baron's Plane

Bill Griggs' Plane

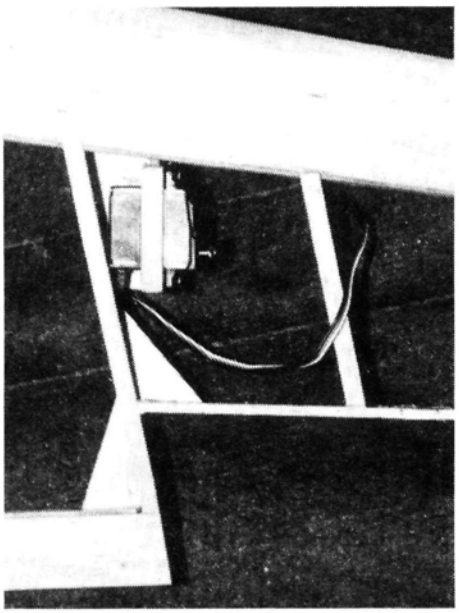
FLYING COUSINS

At this year's KRC Electric Fly, Bill Griggs and David Baron appeared with their own versions of powered Klingberg Wings—showing there's definitely more than one way to skin a cat! Covered in white and yellow film, Bill's plane uses an 05 Astro cobalt turning a 7x4 fixed prop cut down to a 6.5x4 pusher. The power pod is Bill's design, and juice is supplied by two, 7-cell, 800mAh packs in parallel. (Bill is careful to charge each pack fully, and *separately*, before running them in parallel. Charging in parallel should never be attempted because it spells disaster!) The plane flies so fast that Bill often removes one pack to make it more manageable.

David Baron installed an Astro 035 cobalt completely inside the airfoil of his orange wing, and he connected it to the prop with a 6.5-inch shaft. The shaft rotates in an R/C car bearing that's mounted 1 inch inside the trailing edge. A Graupner 7x3 folding prop spins on a custom-built hub that effectively reduces diameter to 6.5 inches, so increasing rpm. A single, 6-cell, 800mAh pack nests in a front bulkhead. David's plane weighs a remarkable 2 pounds, 3 ounces, for a wing loading of only 7.75 ounces per square foot. It flies really well and has sailplane staying power.

drop of CA to the tips of the wires.

Ailerons create more drag when deflected downward than when deflected upward, and this contributes to adverse yaw in a flying wing. I use a 33-percent reduction in downward aileron throw to avoid this problem.



The elevon servo is mounted as far inboard as possible—lighter wings make for a better roll rate. The servo throw should be perpendicular to the elevon hinge axis.

MORE FLIGHT TESTS

After the addition of winglets and aileron differential, flight tests showed a further improvement in tracking—the wing was now "on rails."

Next came duration tests. With peak-charged 1700mAh SCE cells and an 11x7 Sonic-Tronics* folding prop, I could fly the wing at full throttle for more than 9 minutes. Pulling the throttle back gave me about 11 minutes of continuous-run duration. In another test, facing a wind of about 15mph (it seemed to be nearly twice this a couple of hundred feet up), friend and R/C pilot par excellence Michael Lachowski took the sticks. We had changed to a 10x6 prop to reduce the current draw. Using the same cells and running the motor continuously, the plane flew for 10 minutes, 23 seconds. Had it not been windy, I think it might have achieved a continuous run of over 12 minutes.

No, it isn't about to stall! The Wing takes off with authority after a hand-launch.

THE HOP-UP

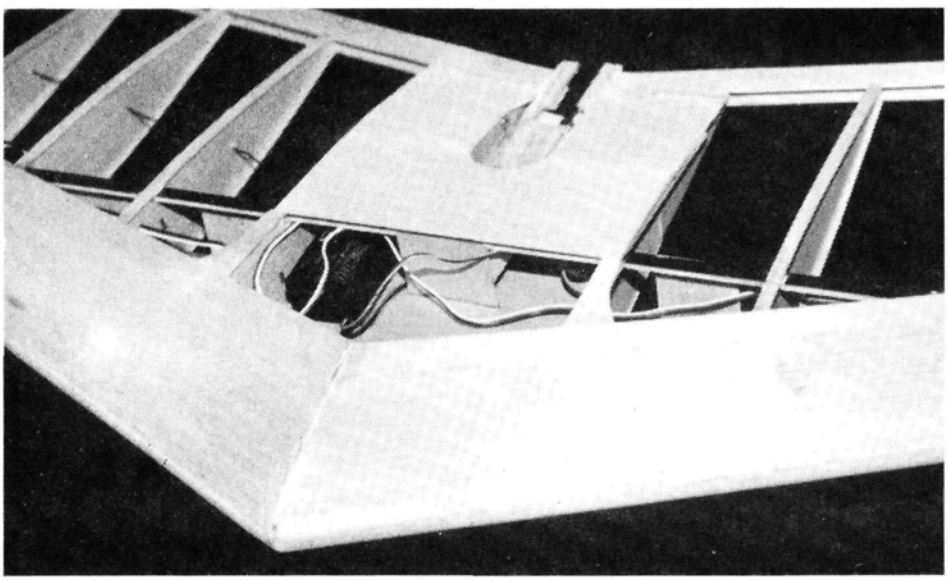
To increase voltage, I added cells to the battery pack. For practical purposes, there's a linear relationship between voltage and rpm, but as you increase rpm for a given prop size, the amp draw increases disproportionately faster than voltage. This means that as you add batteries, you may have to use a smaller prop to keep the current draw within safe limits for your motor. For the hop-up, I chose a 9-cell pack made up of SR* 1000 MAX batteries. I needed a basis for comparison.

With the motor, gearbox and 11x7 prop mounted on the test stand (see sidebar), I found that seven 1200mAh cells produced 5,700rpm with a current draw of 21 amps. With nine SR 1000 MAX cells, the prop turned 6,600rpm at about 27 amps. The FAI 05 motor is happiest when pulling 25 to 30 amps, so stepping up to nine cells didn't require any change in prop size. I would have about 14 percent more speed—boy, was I eager to get to the flying field!

With a pitch of 7 inches, in 1 minute, the plane would theoretically travel 7x6,600 inches = 46,200 inches (3,850 feet). This is equivalent to a speed of about 44mph. A sleek electric unloads in flight (the prop will spin faster) and achieves 15 to 20 percent more speed than indicated in a static test, so this suggested that the wing would fly at least 50mph.

With the 9-cell pack, the wing climbs out as aggressively as most intermediate-level glow-powered trainers. Onlookers have estimated wide-open speeds of more than 60mph, although actual speed hasn't been confirmed. Continuous inside loops can easily be achieved from level flight (definitely a "most loops" contest contender). In a roll, the plane is very impressive—6 feet of rolling wing and no fuselage or tail feathers! Wing-overs and the flying-wing version of an Immelmann are a lot of fun.

With 650 squares and a light wing loading of about 11 ounces per square



Topside, the carbon-fiber-reinforced spar defines the rear-hatch perimeter. The radio battery sits under this spar on the port side; the radio is on the starboard side; the speed controller is directly under the hatch. The use of Velcro® allows components to be moved to alter the CG.

PROP SELECTION & FLIGHT DURATION

Pitch is the forward distance a prop will theoretically travel in one revolution. Rules of thumb can be drawn about the diameter/pitch ratio that's best for an electric in either a fast- or a slow-flight regime. After you've picked some candidate props, the test stand helps you find the best prop for your motor/battery combination and infer flight duration.

Keith Shaw has noted that the recommended ratio for electric high-speed pylon racers is approximately 1:.1, and that a ratio of about 1:.8 may be suitable for aerobatic planes. The slower and more "draggy" the plane, the higher the ratio of diameter to pitch. Electric glider props for basic 2-meter ships typically have ratios in the 1:.5 to 1:.66 range.

Because a propeller "unloads" in the air, a streamlined electric's *in-flight motor run* may exceed its duration on a test stand by 30 to 50 percent. If your prop's pitch is too high, you won't enjoy this benefit; if it's too low, the motor will really whine, but you won't fly as fast.

TEST-STAND BENEFITS

With a simple test stand that includes a voltmeter and an ammeter, you can:

- compare full-throttle, static, watt consumption (volts multiplied by amps) with the motor's input watts rating.
- measure the current (amps) consumed by the propped motor at full throttle to see whether it's operating in the peak area of 8 to 10 times the no-load current draw. (This rule of thumb—applicable to both ferrite and cobalt motors—was provided by AstroFlite's Bob Boucher; no-load current draw is measured without gearbox, hub, prop, or spinner attached.)
- choose the largest prop that can be efficiently spun by your motor.
- determine whether an increase in cell count will require a smaller prop diameter (adding cells or increasing prop diameter increases current draw).

When I found that my motor only pulled 21 amps using seven 1200mAh cells, I raised the cell count to nine SR 1000 MAX batteries. At full throttle, the motor then pulled 27 to 28 amps (an efficient draw for the FAI 05), and I gained about 1,000rpm.

To test a motor/prop combination at a variety of power levels, use your speed controller and a radio. (You could use a variable resistor, but it wastes power and sends you back to the charger more frequently.) You'll see volts and rpm track closely.

With a tachometer and a stopwatch you can:

- measure the duration of motor runs at different throttle settings
- roughly project flight speeds (rpm multiplied by pitch).
- compare the power consumption of two motors, each spinning the same prop at the same rpm.

ESTIMATING MOTOR-RUN DURATION

A 1700mAh cell will theoretically provide:

—1.7 amps for 1 hour
—3.4 amps for 30 minutes
—6.8 amps for 15 minutes
—13.6 amps for 7.5 minutes

Whereas I flew in excess of 9 minutes, flat-out, with a 1700mAh SCE pack, static tests showed a full-throttle run time of about 6 minutes, at which point rpm had dropped from 5,900 to 3,600 (it fell rapidly thereafter). At the outset of the test, 20 amps were being pulled; at 6 minutes, 8 amps.

What was the average current drain in the 9-minute, full-throttle flight using 1700mAh batteries?—60 minutes divided by 9 minutes = 6.66, i.e., current was consumed 6.66 times faster than in a theoretical 1-hour run. Multiplying 6.66 by the nominal 1.7A current yields an average of 11.22 amps delivered to the motor during each minute of the 9-minute flight. (This calculation assumes your battery has its rated capacity, which can be checked using equipment such as the Victor Engineering Hi-IQ.)

A test stand thus permits you to fine-tune your electric power system to optimize either duration or high-performance aerobatic flight. My next step?—to find a folding prop with a pitch-to-diameter ratio in the 1:.8 range (the Sonic-Tronics 11x7 prop I use has a ratio of 1:.64), move to 10 cells, and trim prop diameter to keep the full-throttle amp draw at less than 30 amps. On the other hand, one could argue that the wing already flies fast enough!

foot, the plane shows no bad habits in slow gliding flight, prop tucked behind. It did, however, literally fall out of the air during one slow, low-altitude, downwind turn just as the battery power dropped off (pilot error!).

As an alternative to the 9-cell combination, I also flew the wing with a pack made of eight, Trinity* Pushed 1400mAh SCR cells. Weighing about 15 ounces (2 ounces heavier than the 9-cell 1000 MAX pack), this pack spun the prop at 6,700rpm with a current draw of about 27 amps. Selected by Trinity for their capacity and voltage characteristics, these cells are powerhouses. My Victor Engineering* Hi-IQ indicated a capacity of more than 1500mAh after I had peak-charged them a second time. A slightly heavier ship results, but flight times are also longer.

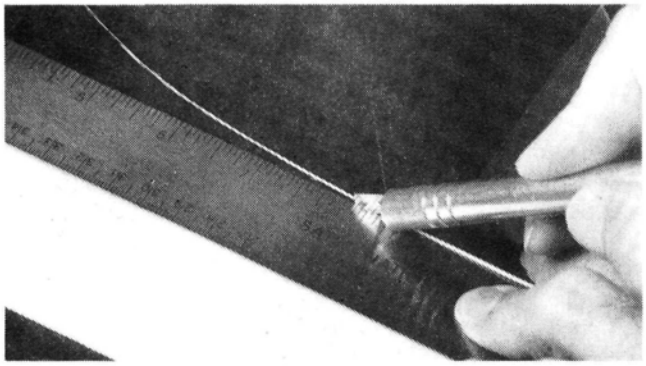
(Continued on page 114)

HOW TO:

by RANDY RANDOLPH

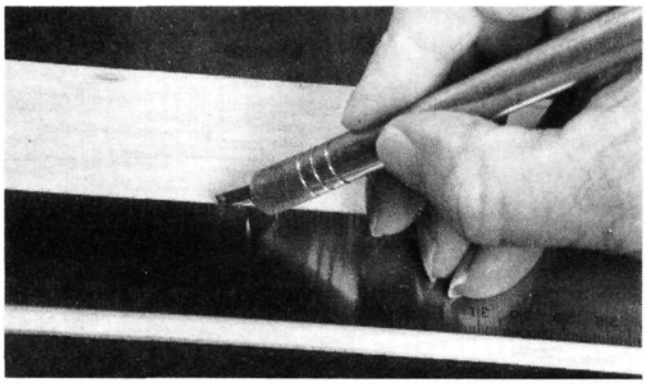
BAND SAW RIBS

Within the last few years, the small band saws that are available for less than $100 have found their way into our workshops. These tools enable us to produce wing ribs rapidly and accurately. The photos show you how to set up a stack of rib blanks for sawing, while wasting as little material as possible.

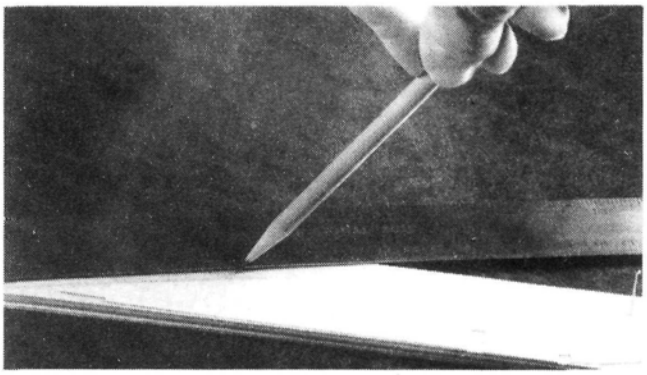


1. *Since sheet balsa warps, both longitudinally and laterally, you should first straighten the long edges of the sheets that you'll use for ribs. (A metal straightedge and a razor knife are the proper tools.)*

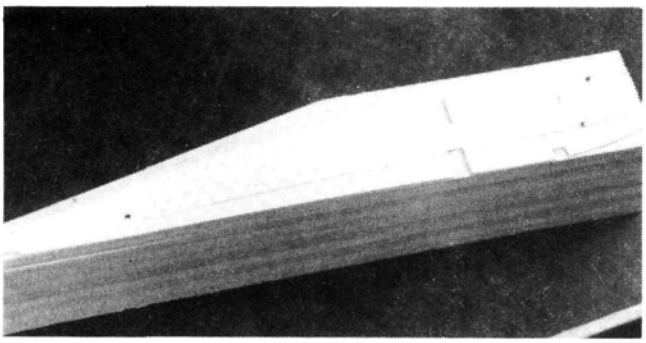
2. *In this case, the ribs will be 1 1/4 inches deep at their widest point, so you should cut 1 1/2-inch-wide strips. Measure and mark both ends of the sheet.*



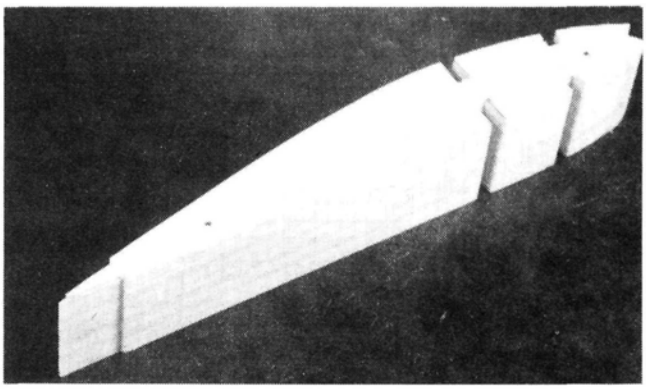
3. *Align the straightedge with the marks you made on the sheet and slice the sheet into strips. If the ribs are less than 1 inch deep at their widest point, you'll be able to cut three strips out of one sheet .*



4. *Position the rib template so that the leading edge is at the end of a balsa strip, and draw a diagonal line across the strip at the trailing edge. This line should be more or less parallel to the rib's trailing-edge taper.*



5. *Slice along the diagonal line, and use the piece formed as a template for cutting rib blanks. Pin the blanks together, through the rib template, to prepare the stack for sawing. To secure thick stacks, push pins through from both sides.*



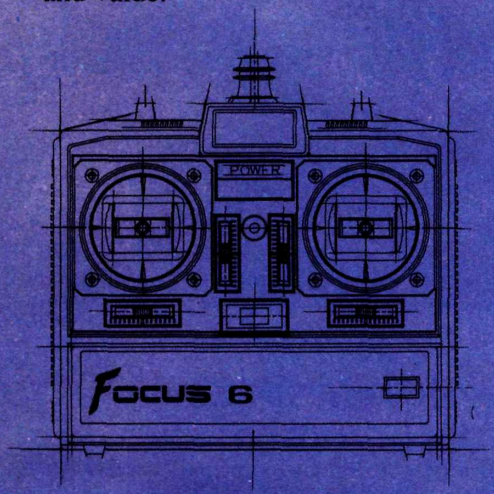
6. *Saw the stack to match the template. This method of building a stack of blanks works well with flat-bottom or semisymmetrical ribs and uses approximately the same amount of material as when cutting out the ribs individually from sheet stock.*

Design...

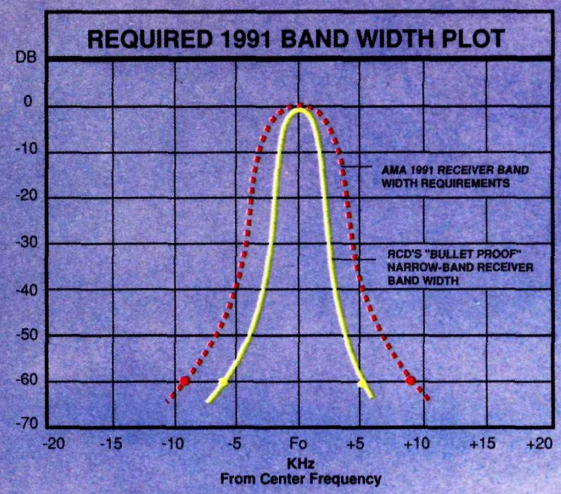
A New Starting Point

Quality begins with design. In RC, no design is more important than the one that serves the flying modeler. At Hitec, we put you in the center of our design effort. We heard all the talk about radios and the 1991 flying environment. And we listened.

With this in mind, we designed a sport radio series that is tops in performance and reliability. From form to function, the Focus Series is unsurpassed in quality and value.



Feel the comfort of the slimline design in the Focus case. Engineered for both function and comfort, the quality craftsmanship is obvious. Pick up a Focus transmitter and you won't want to put it down.

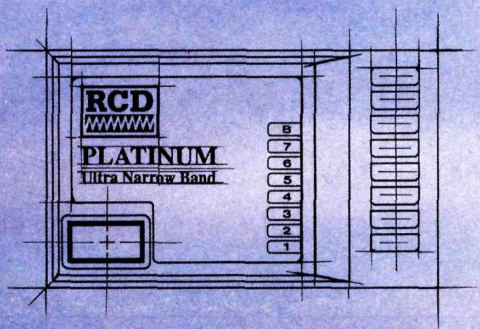


RCD is at the leading edge of narrow band dual conversion technology. RCD receivers surpass AMA guidelines and are virtually immune from stray RF signals.

Focus on Features

For sport flyers seeking the most bang for the buck, Focus is the answer. The Focus Four FM features servo reverse and ATV on all channels, comes standard with the 1991 RCD Platinum Receiver, is trainer capable and includes three super accurate HS-500 servos. The Focus Six FM includes four HS-500 servos and the RCD Platinum Receiver. Our Focus Four FM-E, design for moter-powered gliders and electrics, includes two HS-101 micro servos, On-Off/auto-cutoff switch and the RCD Micro 535 Receiver. All systems feature full NiCDs and Charger.

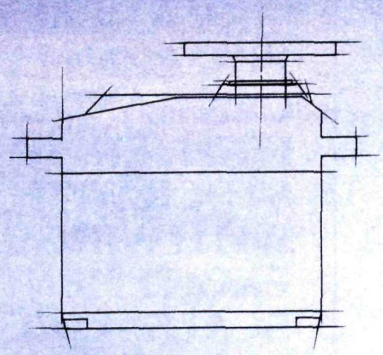
The ability to reject unwanted RF signals is the single most important feature of any RC system. Nothing does it better than the RCD's Ultra-Narrow Band Dual Conversion Platinum Receivers.



Focus On Performance

There is no greater danger to the model flyer than radio interference. Stray signals, local pager systems and third order interference can spell instant disaster for you and your model. Fear no more. Focus radios come equipped with RCD Dual Conversion Platinum Receivers. Dual Conversion means no threat from 3IM. Platinum means they surpass the AMA guidelines for 1991 narrow band acceptance. When it comes to "narrow band", these receivers are the narrowest.

The HS-500 is simply the finest, most reliable standard servo available for airborne use. With iron/oilite bearing-supported output shaft, indirect drive and custom IC for 1/4 degree centering accuracy, the HS-500 assures superior tracking, long life and constant high torque.



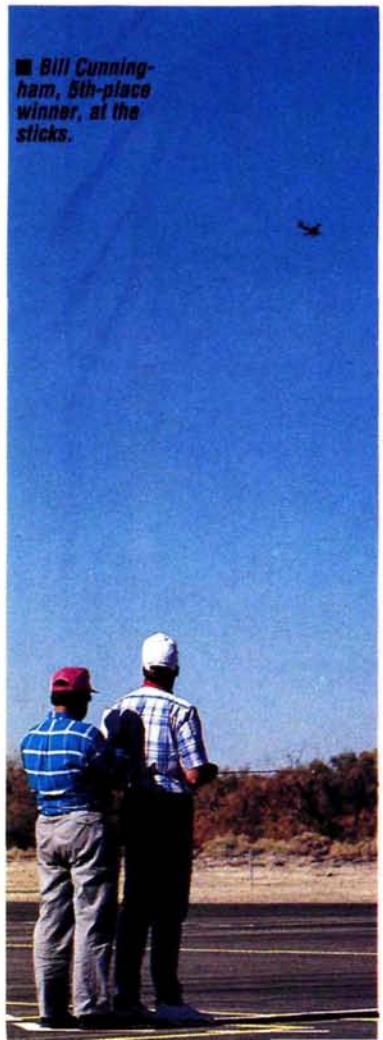
Focus On Value

There's one thing that we didn't design into the Focus radios—a price tag with a big number. That makes Focus the value leader in affordable radio systems. Come and see for yourself. The Hitec Focus Series is available at finer hobby shops across the country.

PHOTOS BY YAMIL SUED & TOM ATWOOD

Above: From lower left, clockwise: ■ 1990 TOC champion Chip Hyde, 18, receives 1st prize and a $25,000 check. Chip also won $2,500 when he placed 2nd in the Free-Style event. ■ Chip's Ultimate Bipe, powered by a Sachs Dolmar 4.2, in knife-edge flight. ■ Chip's Ultimate in a close flyby. ■ Chip with his winning plane.

DO YOU REMEMBER the first time you were moved by the spectacle of world-class sport competition? This was the kind of experience I had at the Tenth Invitational International Tournament of Champions (TOC), held in Las Vegas, NV, from November 8 through 11. During four days of perfect desert weather—with temperatures hovering between 78 and 80 degrees and only the slightest breeze—a fiercely competitive battle was waged among the world's R/C grand masters. An estimated 10,000 spectators attended this impressive, four-day event.



■ *Bill Cunningham, 5th-place winner, at the sticks.*

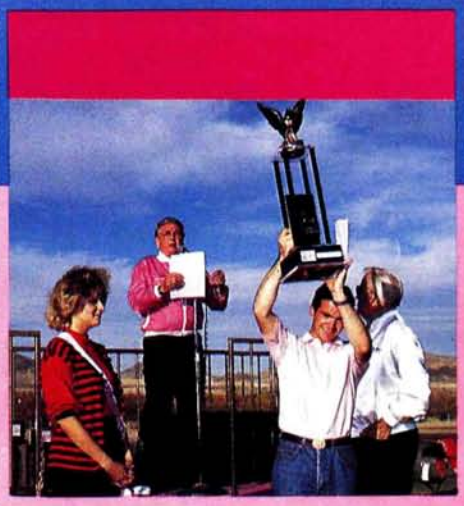
by TOM ATWOOD

1990 INTERNATIONAL Tournament

Above: Ultimate Biplane in Free-Style competition.

The Circus Circus R/C field is a new facility only seven miles east of the Circus Circus hotel and casino. Funded by William G. Bennett, (chairman of the Board of Circus Circus Enterprises, Inc.), the field offers several hundred feet of paved runway and a well-manicured, grass-covered pit area. All the amenities any competitor or spectator could want were readily available. There was no charge to attend the TOC—this R/C olympiad is generously sponsored by

Aerial view of the TOC site.



Quique Somenzeni receives Free-Style competition 1st-place award and a $5,000 check. He also finished 7th in the main tournament, winning an additional $4,500.

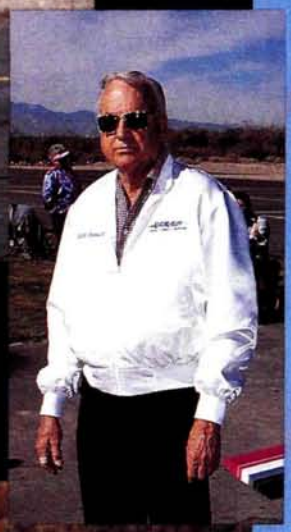
# of Champions

Circus Circus Hotel and Casino to promote the very best in aeromodeling competition.

TOC—LAND OF THE GIANTS

The TOC has been held approximately every two years since 1974. At this—the tenth—21 contestants (11 from the U.S. and 10 from abroad) vied for $126,500 in prize money. The contestants were selected because of their

Hajime Hatta's Ultimate ready for takeoff.



Bill Bennett, Chairman of the Board, Circus Circus Enterprises, Inc, and the key force behind the TOC since 1974. From all of us aeromodelers, "Thanks Bill!"

Peter Wessels tells judges the direction for takeoff.

Ken Binks' Extra 300, powered by a King 67, comes in.

John Beasley's Ultimate climbs out in the Free-Style event.

Chip Hyde's Ultimate in an inverted maneuver.

Glichi Naruke of Japan, won $5,000 as 6th-place winner.

1990 TOC

Close-in shot of the prep area behind the flight line.

Steve Striker, who took 4th place in the tournament, prepares for flight at the top of the ready line; excitement was palpable.

The pilots' concentration was intense. Here, David von Linsowe, 3rd-place winner of the Free-Style event, practices an aerobatic routine.

John Britt, winner of the Best Model award, practices on the sticks while another pilot flies.

Close-up of the cockpit in John Britt's Steen Skybolt. Detailed pilot sported awesome satin uniform.

John Britt's Steen Skybolt won the $3,500 Best Model award. Fully functional flying wires (designed for stresses up to 18 Gs) accented this show-stopping, Tartan-powered model. Plane featured a Delorto carburetor, V-Tech muffler, Dailey 19x9 prop and John's own spinner. Fuse was made of fiberglass and carbon fiber, with wings of balsa and spruce.

outstanding performance in national and international R/C flying contests. To read the short biographies of the competitors in the TOC program book is to review summaries of the greatest achievements in R/C aerobatic competition.

"I LOOK FORWARD TO FLYING AGAINST HANNO EVENLY, WHEN WE ARE BOTH WELL-PREPARED."
Chip Hyde

At the previous TOC in 1988, Austria's Hanno Prettner took 1st prize by defeating 19 top-ranking pilots from nine nations. An electrical engineer, Prettner had won eight of nine previous TOC events; he had also been aerobatic world champion six times, and 15 times Austrian National Champion. It was a deep disappointment for all when Prettner, despite the arrival of his EZ Laser 200/Skybolt, was unable to attend the tournament owing to illness.

In '88, Chip Hyde, then only 16 years old, took 2nd place. Chip's achievements include taking 1st place in the '82, '84, '88 and '89 U.S. Nationals, 4th in the '89 World Championships and 1st in the '87 Masters. Throughout his life, Chip has displayed a precocious brilliance in pattern competition (see sidebar).

Third place in '88 went to Wolfgang Matt of Liechtenstein; he had been world champion twice and European champion three times, and he placed in the top five during previous TOCs. Many other famous names repeatedly show up as you look through the results of previous Tournaments.

THE CHALLENGE

The TOC is intended to duplicate full-scale aerobatic competition to the greatest degree possible. Aircraft must be replicas of full-size planes and designed for aerobatic maneuvers. Model dimensions must be within 10 percent of scale; airfoils aren't restricted; the maximum allowed engine displacement is 4.5ci (75cc); and weight may not exceed 22 pounds. The minimum wing area allowed is 1,100 square inches for monoplanes and 1,500 squares for biplanes.

Competition is divided into a series of

Sensui Kazuyuki, Japanese Nats champ, flies the Kalt Omega. Another member of Team JR stands behind him.

A well-informed spectator catches up during a break.

Curtis Youngblood's modified X-Cell relaxes between physics-defying maneuvers.

"Known" and "Unknown" aerobatic routines. "Unknown" pattern programs were given to pilots only the night before they were to be performed, and no practice was allowed. A separate, "free" competition (distinct from the main contest) offered prizes of $5,000, $2,500 and $1,000 for 1st, 2nd and 3rd places.

On each of the four days, there was a 3-minute Free-Style "side" event and Known/Unknown events. Biplanes were given a 2-percent advantage in the pattern competition, but no advantage in the Free-Style competition.

THE PLANES

It's interesting that of the 22 planes entered, 13 were Ultimate Biplanes (the majority of which had been framed by Precision Built, Inc. of Spring Branch, TX). Other biplanes included John Britt's Steen Skybolt (Best Model), a Bucker Jungmanns flown by George Manning

Far left: Australian Jeff Tracy competed with this beautiful Sukhoi SU 26M, powered by a Sthill engine.

Left: Steve Rojecki's Bucker Jungman, with a Tartan Twin engine, coming in for a landing. Steve took 2nd place at the TOC.

TOC FINAL STANDINGS

PLACE	PRIZE MONEY
1. Chip Hyde (Yuma, AZ)	$25,000
2. Steve Rojecki (Pensacola, FL)	15,000
3. Wolfgang Matt (Liechtenstein)	10,000
4. Steve Stricker (Baltimore, MD)	6,000
5. Bill Cunningham (Tulsa, OK)	5,500
6. Giichi Naruke (Japan)	5,000
7. Quique Somenzini (Argentina)	4,500
8. Ivan Kristensen (Canada)	4,000
9. Dean Koger (Xenia, OH)	3,500
10. Gunter Hoppe (Germany)	3,000
11. Don Weitz (Henderson, NV)	2,750
12. John Britt (Lee's Summit, MO)	2,750
13. David von Linsowe (Mt. Morris, MI)	2,750
14. Steve Helms (El Toro, CA)	2,750
15. Peter Wessels (Germany)	2,750
16. George Manning (Grand Terrace, CA)	2,750
17. Hajime Hatta (Japan)	2,750
18. John Lockwood (Clovis, CA)	2,750
19. Jeff Tracy (Australia)	2,750
20. Ken Binks (England)	2,750
21. John Beasley (Ireland)	2,750

THREE-MINUTE FREE CONTEST

PLACE	PRIZE MONEY
1. Quique Somenzini (Argentina)	$5,000
2. Chip Hyde (Yuma, AZ)	2,500
3. David von Linsowe (Mt. Morris, MI)	1,000

and Steve Rojecki, and a Courtesan, flown by David von Linsowe. (This plane was a substitute for an Ultimate that came to an untimely end owing to a radio glitch on the first day.) Monoplanes included two Extra 300s, owned by Ken Binks and Peter Wessels, the Extra 230 flown by Dean Koger, John Lockwood's CAP 21 and Jeff Tracy's Sukhoi SU 26M. Typical engines flown included Sachs Dolmar 4.2s, Titan Z G62-Ss, Tartan Twins and a Zenoah G-62 with an A&R ignition.

THE COMPETITION UNFOLDS

In the first two days, as the finalists emerged, you could have cut the tension (and excitement) in the air with a knife. The two teams of judges were made up of distinguished international authorities in both full-scale and R/C aerobatics. They sat only a few feet from the beautifully laid-out asphalt runway and directly in front of the landing box. Their exacting scrutiny of each flight (despite the necessary repetition and the hot sun), bespoke the seriousness of their mission.

To the right of the judges, three or four planes would rotate through the lineup as rounds were flown. Each pilot walked to the flight box and signaled his takeoff direction to the judges. Meanwhile, an assistant carried or "walked out" the taxiing plane to the takeoff position. Standing nearby and slightly behind, most pilots had a second who held a copy of the pattern being flown.

How close was the competition? The judges I spoke with noted the proficiency shown by all fliers—a level of skill that seemed to exceed that of previous TOCs—and the tight margins that separated the top fliers scores.

After Thursday, the front runners were, in descending rank: Wolfgang Matt, Steve Rojecki, Chip Hyde, Bill Cunningham

A SMALL WONDER

by DAVE BARON

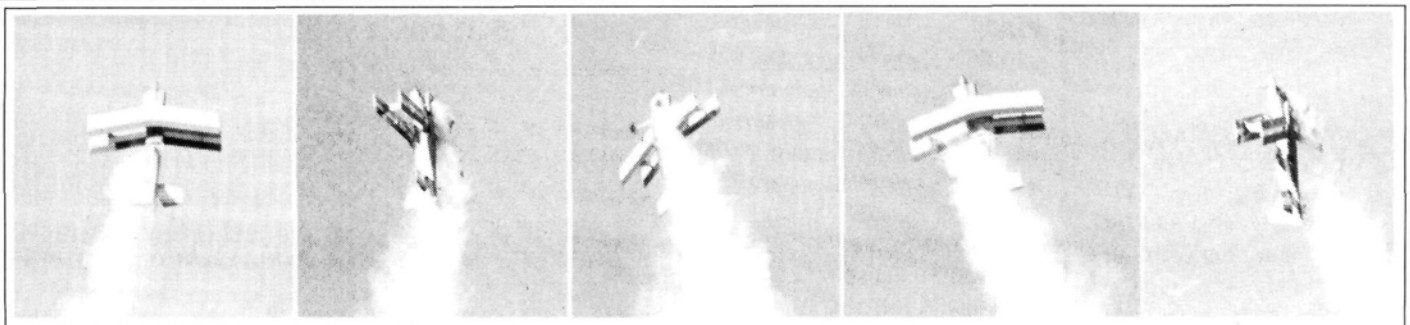
While serving in the Marine Corps in 1978, I was transferred to MCAS Yuma, AZ. It was truly the end of the rainbow for an R/Cer—360 flying days a year! The first modeler I met there was a retiring Navy chief called Merle Hyde, who was checking out while I was checking in. I had noticed an R/C magazine held under his arm while we were waiting in line, and we struck up a conversation immediately. He proudly told me about his 6-year-old son, Chip, who was already participating in his first pattern contests.

I was skeptical, of course, but I soon saw Chip in action, steady as a rail, practicing his pattern routine with all the discipline of a seasoned pro. His ability to understand and learn new maneuvers was incredible. I got Merle's (reluctant!) permission to let Chip fly my .60-powered Steen Skybolt. As far as I knew, he had never flown a biplane and had used only single-stick radios. His hands barely fit my two-stick system! He soon got the hang of things, however, and it wasn't long before he was doing maneuvers like long slow rolls right over the runway.

Then, as he flew inverted, my engine died—lean. There wasn't enough time or altitude to pass the transmitter to me, so Chip smoothly rolled the bipe over and set it down on the sand off the end of the runway. I couldn't have set the plane down any more lightly myself, but when the wheel pants dug into the sand, the plane tumbled like a gymnast!

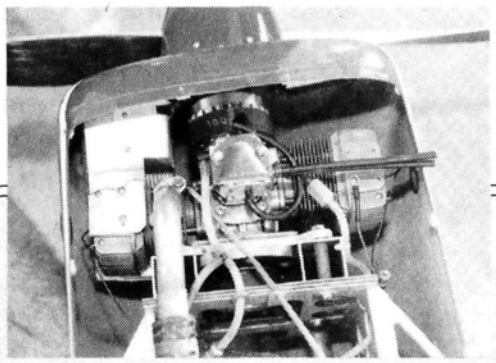
Only the wheel pants were scratched, but Merle decided that it was no longer a good idea for Chip to fly other people's planes. It wasn't little Chip's fault, though; the best R/C pilot in the world couldn't have done any better!

Chip Hyde in 1978.



Chip Hyde's Ultimate in a slow torque roll.

and Steve Stricker. Two more days of Known and Unknown competition lay ahead, and then the final day of particularly rigorous flying. Chip Hyde was ranked 1st on Friday and Saturday, and the other top fliers identified early on fought for rank in his wake. At the Tournament's end, the positions were: Chip Hyde, 1st; Steve Rojecki, 2nd; Wolfgang Matt, 3rd; Steve Stricker, 4th; and Bill Cunningham, 5th. Their cumulative scores had a spread of less than 5 percent.



Double reduction belt drive in the Extra 230.

SKY DANCING

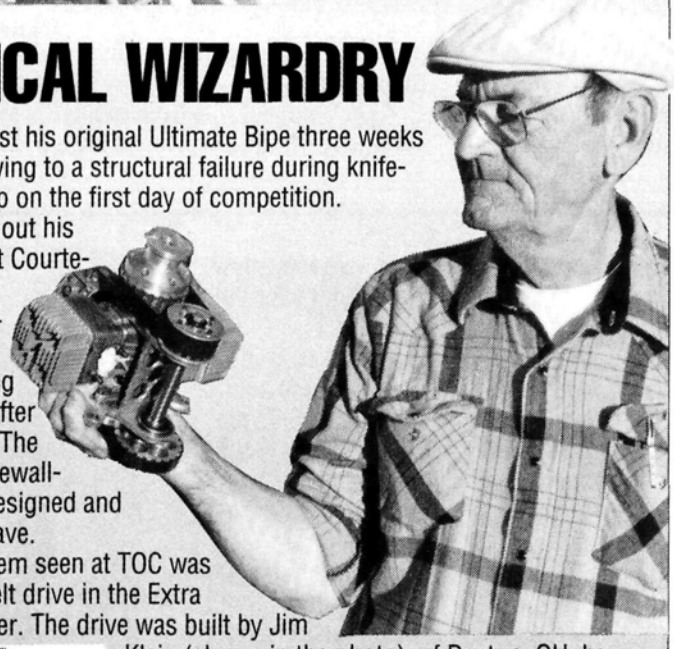
Scored separately from the main event, the 3-minute Free-Style competition was a display of creative flying at its best—apparent magic on the R/C sticks was commonplace. Chip, who took 2nd, generated roars of approval from the crowd with a flawless knife-edge vertical figure-8 and a snap roll every 180 degrees. His slow-motion torque rolls—the plane hanging suspended—slowly revolving through plumes of smoke, were also crowd pleasers. Chip's ability to fly nearly perfect 360-degree circles interspersed with barrel rolls or snap rolls in alternate directions was astounding. His routine, which was full of such feats, was marked by talent, discipline and energy.

David von Linsowe's exciting routine was moderated in Reno-announcer fashion by his brother John. His awesome Lomcevaks, alternating inverted and upright spins, and a unique maneuver (the "falling leaf") in which the plane slipped sideways, back and forth, while losing height (also done inverted) delighted the crowd. Dave took 3rd in this event.

The pilot who seemed to be the people's favorite was 1st-place Free-Style winner Quique Somenzini. His flying was a sublime ballet, executed with a meter and grace that left spectators shaking their heads in disbelief. Has anyone ever performed slower, flatter inverted spins, or flown a series of aerobatic maneuvers in such an artistically beautiful, even soulful, manner? Quique set a record in 1979 when, at the age of 12, he was the youngest pilot to compete in a World Championship, and he is, no doubt, a pilot to watch at future TOCs.

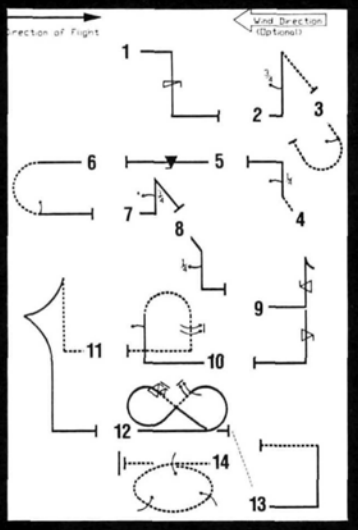
MECHANICAL WIZARDRY

David von Linsowe lost his original Ultimate Bipe three weeks before the show, owing to a structural failure during knife-edge flight and a backup on the first day of competition. Undaunted, he brought out his brand-new scratch-built Courtesan—the only biplane with retracts in the contest. The sight of the retracts smoothly pulling back into the fuselage after liftoff was a pretty one. The retracts, which use a firewall-mounted servo, were designed and machined entirely by Dave.



Another innovative item seen at TOC was the double-reduction belt drive in the Extra 230 flown by Dean Koger. The drive was built by Jim Klein (shown in the photo), of Dayton, OH; he was formerly a designer of power systems for RPV's at Wright Patterson AFB. The two 16:22 belt reductions yield a combined 1.89 reduction to the prop. These are the same three-eighths belts that drive the camshaft on a Ford Pinto. This Tartan twin now turns a 24x17 prop at about 5,800rpm, easily pulling a 21-pound airplane through the air.

FACE THE UNKNOWN



■ *Imagine you're competing with the best four R/C fliers on the planet, and you must fly a pattern routine you've never flown before! Here's a synopsis of the Unknown Pattern #4, which is given to finalists only the night before the last day of the TOC.*

1. From level flight, perform a one-turn positive spin.
2. Pull to a vertical upline. Perform a three-quarter roll. Pull to inverted flight across the direction of the flight (crosswind).
3. From inverted, a half-roll followed immediately by half an outside loop.
4. From inverted, push to vertical upline and perform a quarter-roll; then push to horizontal flight.
5. Perform one negative snap roll, and recover to level flight.
6. From level flight, push into a half outside loop followed immediately by a half-roll to upright level flight.
7. Pull to a vertical upline and perform three points of a four-point roll. Push to horizontal across the direction of the flight (crosswind).
8. Push to vertical downline and perform a quarter-turn; pull to horizontal flight.
9. Pull to vertical upline and perform one positive snap roll, then a stall turn and one positive snap roll on the downline; pull to horizontal flight.
10. From horizontal, pull to a vertical upline and perform a half-roll. Push into a half outside loop and then, on the vertical downline, perform two consecutive rolls; push to inverted flight.
11. From inverted, push to vertical upline and perform a "stick-back" positive tailslide; pull to horizontal flight.
12. Perform an upright horizontal 8 with 1½ rolls in the first segment and 1½ snap-rolls in the second segment.
13. From horizontal, pull to a vertical upline, and then pull to horizontal inverted flight.
14. From inverted, perform a three-turn rolling circle. The three rolls must be continuous, equally spaced and to the inside of the circle.

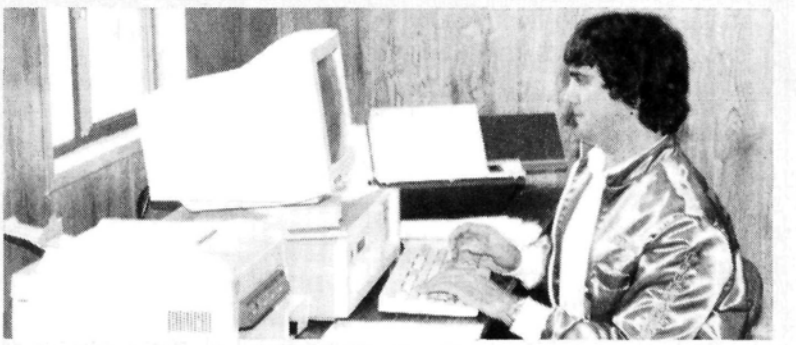
The judges' concentration was intense.

CHAMP'S COMMENTS

Toward the end of the tournament, I caught up with Chip Hyde, who, though clearly proud to be the front-runner in such distinguished company, was disappointed that he hadn't had a chance to compete against Hanno Prettner. Chip said he looks forward to flying against Prettner evenly, when both are well-prepared.

Chip won the TOC with a precision-built, balsa-and-foam Ultimate Bipe covered in MonoKote and powered by a Sachs Dolmar 4.2 glow engine. The plane has a custom Slimline smoke muffler, a D-W 20x12 prop and a Tru-Turn spinner. A soft engine mount was made out of a truck's inner tube. Controlled by a Futaba 9-channel PCM 1024, the plane weighs 20 pounds dry and a couple of pounds more when loaded

KEEPING SCORE



A small, unobtrusive "office" near the announcer's table was the nerve center for the TOC competition. Assisted by his wife, Vicky, and several others, systems analyst and Contest Operations Manager Mike Lauman (shown in photo) compiled judges' scores, distributed pattern routines the night before they were to be flown, kept track of the current standings and handled other administrative functions.

To calculate the contestants' scores, Mike used a computer program he wrote four or five years ago for a local pattern contest. This program is now used in about 75 percent of the major pattern contests in the U.S. For streamlined data entry, judges' scores at the TOC were marked in pencil on sheets similar to those used in SAT tests. The program applies a "K factor" (difficulty quotient) to each maneuver and calculates a total score for each round. It then combines the points for each round to give current standings and final scores.

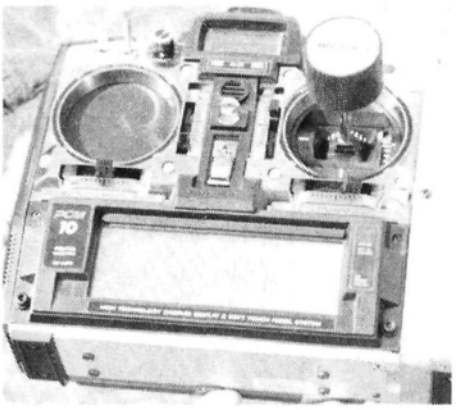
Mike has administered the scoring at AMA Nationals since '86; and he also scored the '88 TOC, two U.S. Masters and other prestigious events. The next time you attend a major pattern competition, there's a good chance you'll find his program putting it all together!

TOURNAMENT OF CHAMPIONS

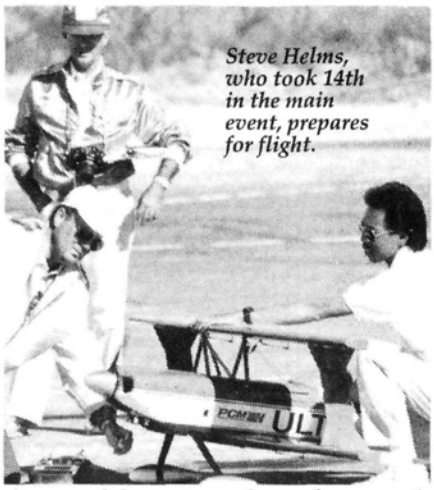
with smoke fluid and fuel.

BREAK EXHIBITIONS

Between rounds of competition, we saw amazing demonstration flights. Ron Gilman and Kent Nogy (representing Bob Violett Models) flew the F86 Sabre and the Viper. Also exhibiting their flying skills were the Kalt Helicopter Demonstration Team of Japan, the Team JR heli team, Larry Jolly (who flew a Kalt Whisper hopped-up with an Astro Flight cobalt motor) and Curtiss Youngblood (helicopter pilot extraordinaire), who demonstrated too many physics-defying maneuvers to count—topped off by an inverted autorotation from a high altitude!



Curtis modified his JR PCM 10 for single-handed flying. Is that the trick to making it look so easy?



Steve Helms, who took 14th in the main event, prepares for flight.

DON'T MISS IT

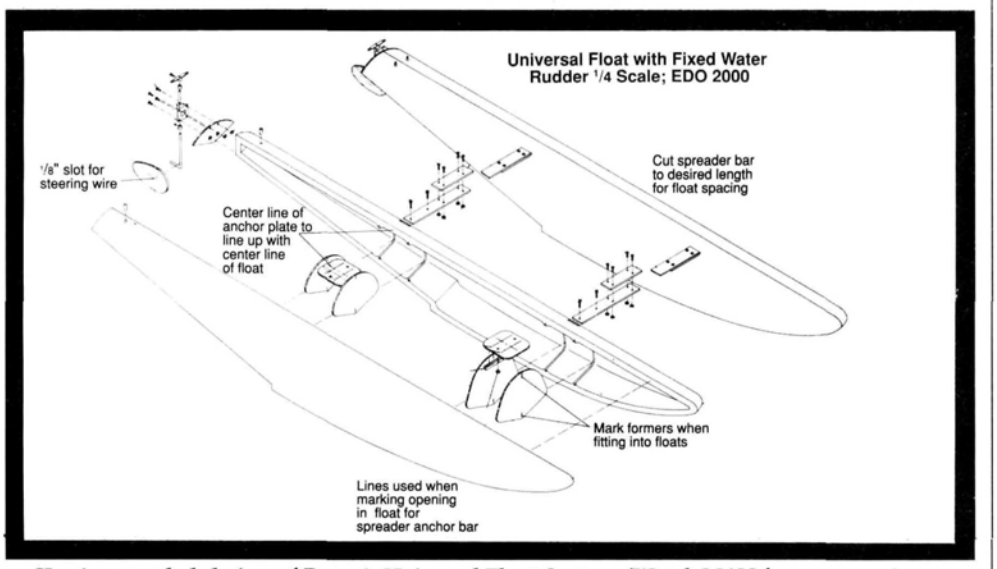
The people who ran the TOC deserve credit for a job well done. Although there are too many to mention, they include Phil Kraft (contest director); Maurice Franklin (announcer); James "Doc" Edwards (chief judge); and Mel Larson (VP and Director of Circus Circus—and from whose helicopter we took our aerial shots) and Tom Tomlinson (director of marketing for Circus Circus Hotel and Casino), both of whom orchestrated much of the program. Aeromodelers everywhere also owe thanks to Bill Bennett, who has been the driving force behind this fantastic biannual event. Don't miss the next TOC if you can make it; you'll have a *great* time. ■

Spacious grassy area accommodated pilots and planes behind the flight line. Judges (at far left) relax between flights.

FLOATING AROUND

Oshkosh float fly, Schneider preparations

by JOHN SULLIVAN



Here's an exploded view of Byron's Universal Float System. (Watch MAN for an upcoming construction review.)

"FLOATING Around" has had some good luck! After reading the "Float Documentation" article in the October issue, Mike Fink of Byron Originals* sent me a 1/4-scale Byron EDO 2000 Series float kit, a rudder-system kit and a glassing kit. Mike wants to spread the word about Byron's scale floats and enable *MAN* to do a construction and performance review.

I've opened the kits' boxes (three) and examined their contents, which include excellent parts, packaging and instructions. (Everything except gear and paint is included!) The float hulls consist of two pieces of injected foam that are glued together and trap plywood bulkheads in pre-formed interior channels. The bulkheads trap horizontal plywood plates that serve as hard points for the aluminum strips that exit the hull sides and are attached to aluminum spreaders.

I'll give the whole caboodle to a responsible(?) member of the Hennessy Pontoons for construction, testing and a review as soon as possible! I thank Mike and Byron Originals for entering the "float fray."

OSHKOSH GIANT SCALE RALLY

Speaking of Hennessy Pontoon members, one of our avid fliers, Warren Olson, attended the IMAA Rally of Giants at Whitman Field in Oshkosh, WI, on the weekend of June 30 and 31, 1990. Warren reports that the meet, the EAA site and the weather were great!

At the Oshkosh Seaplane Base on Lake Winnebago, a giant-scale float fly was held in conjunction with the rally. Lloyd Roberts of Camden, ME, scratch-built a 104-inch, 28-pound Lockheed Sirius from Wendell Hostetler plans (see photo). He also scratch-built its floats (using information provided by the EDO Corporation). Lloyd, who was the technical inspector for the float fly, powered his plane with a Saito* 270 twin. Using a magnifying glass, I've been looking at the slide taken of the Sirius, and the plane and floats look flawless. It must have been thrilling to see it fly!

(Continued on page 52)

Fred Kouka brought his scratch-built Cub all the way from Jacksonville, FL, for the IMAA rally. It's an example of outstanding scale work.

Lloyd Roberts proudly displays the Lockheed Sirius that he flew at the 1990 IMAA Oskosh Rally of Giants. (Photo by Warren Olson.)

FLOATING AROUND

(Continued from page 51)

Fred Kouka of Jacksonville, FL, had a scratch-built Piper Cub on EDO floats. Fred went directly to the Piper factory and EDO for information on his Cub, which is powered by an O.S. 2.4 twin with CH ignition.

Roy Hinds, the IMAA District I Director, was also the float-fly director. Because it was the event's first year, the turnout was modest, but there was a photographer from California and fliers from Florida and Maine there, so it seems as if this meet has drawing power and will grow. Now, if only *I* could find a way to get to Oshkosh next June....

SCHNEIDER SCALE PLANS

A few months ago, I received a letter from Bob Banka of Scale Model Research*. He said that he had acquired rights to a collection of Schneider racer three-views, and that he would soon publish a list of available drawings. I just received the list, and there are exactly 100 Schneider racers on it. This list is longer than the 81 eligible racers acknowledged by the Schneider Committee but, if Bob has unearthed 19 *additional* Schneiders, so much the better!

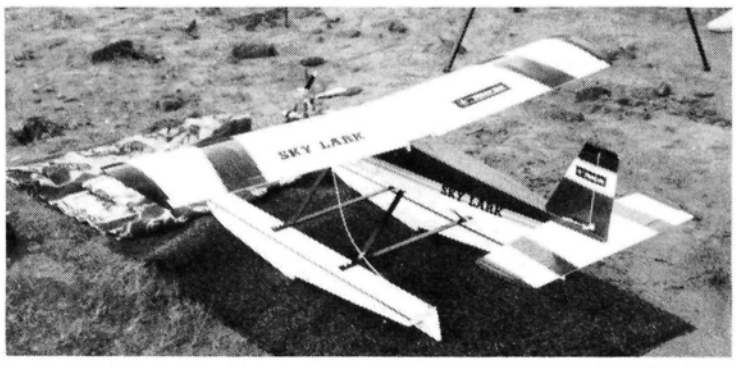
The three-views were prepared by A.C. Kavelarrs in the late '70s, and they're an extensive, fascinating body of work. I've compared the Kavelarr three-views of our Savoia S65 to the Hirsch drawings and photos, and I've find small discrepancies on the Kavelarr drawings. On the other hand, the Kavelarr three-views have some details that clarify the obscure areas on the photos. If we were to build another Schneider, I'd buy plans from both Hirsch and Banka for the best overall documentation. The Scale Model Research Plans cost $3 each, which is a small investment when you consider the total cost of these models. Bob also has over 100 cover-photo packs of various floatplanes and amphibians, and I recommend that you contact him for documentation.

BERNARDS AND DUPERDUSSINS

To give you an idea of the technology and development these floatplanes embrace, this year, I'll present photos and information on completed Schneiders .

Bill Curry of St. Helena, CA, sent me a photo of his 1931 Bernard HV220. The original Bernard came within a month of completion for the 1931 Schneider race. At the time, the French asked the British and the Italians (who had almost finished the Macchi MC72) for a postponement of the race. The British, who refused, took the Schneider Trophy

THE FLOATING MAILBAG



Wayne Cummings' Skylark Thunder Tiger 40T is on Sullivan floats. LaGrange, GA, fliers have taken the plunge, and they love it!

Sometimes, being involved in hobby manufacturing gives me an unusual perspective. About six months ago, a modeler from LaGrange, GA (sorry, I can't remember his name) called me. He ordered a pair of floats, put them on his plane, demonstrated float flying to other club members, and then my phone *really* started ringing! Before it was over, it seemed as if I had talked to half the modelers in LaGrange. It was a great experience!

Wayne Cummings, owner of the LaGrange Machine Shop, sent in a photo of his Skylark Thunder Tiger 40T. It's powered by an O.S. 70 Surpass swinging a 12x8 Master Airscrew* prop. With 36-inch Sullivan* floats, its flying weight is 8½ pounds, and it uses a JR* Max FM radio. Wayne uses the rudder system that was featured in the October '89 Floatplane Issue. He says the Skylark 40T flies well, and he has no complaints.

Ever since he broke my test float for the Beast, Ed Westwood has been unusually quiet. Still, he's published two issues of the "Northwest Float Flyer"*, written half-a-dozen letters, made a phone call and sent in the item I treasure most: his entry for our "Beauty and the Beast" contest. (You didn't know about that?) Taken on a sunny day in Spanaway, WA, this photo shows Carol Weston, daughter of Paul Weston who co-designed the Beast.

As I write, we're about five weeks away from completing the first run of Beast kits. We have several prototypes under construction, with power ranging from a .30 Wankle to a .65 Saito 4-stroke swinging a Grish three-blade 11x7½ prop. This should be interesting, to say the least!

The first entry in the "Beauty and the Beast" contest—Carol Weston makes the perfect foil for her father Paul's .50-powered Beast.

for the third consecutive time, retired the cup and ended the competition. It was too bad, but those were the rules.

Bill's 92-inch-span Bernard weighs 32 pounds and has a 50-ounce-per-square-foot wing loading. It's powered by a Super Tigre twin 60 swinging a 22x10 prop. The exhaust is pumped through a pair of K-Mart lawn-mower mufflers that have copper-tube custom headers. The Bernard is painted light gray/blue with Ditzler acrylic lacquer, and it's clear-coated with K&B* Satin epoxy. Bill did an outstanding job on the scale details, and his craftsmanship and the Bernard's size make it a very impressive model.

Sad to say, there are problems. The Bernard's floats have bellies in their rockers, and this configuration, combined with a deep keel and a vee-step, causes the plane to porpoise *and* veer uncontrollably from side to side. Bill has been working with Don Panek of Bakersfield, CA (who's also building a Bernard), and he has the same problem. At this point, it seems that Bill won't have time to modify his float bottoms for the race, but Don might try. Other float bottoms (i.e., Ken Bundt's Supermarine, the Martin Group's RC32 and a couple of the Macchis) have the same problems, and it looks as if this subject will have to be addressed at the race. I'll keep you posted.

Dick Skogland of Lancaster, CA, sent in a photo of his 1913 Duperdussin. This 90-inch French entry has cable-actuated wing warping, and it was powered by a 4-stroke 120 in last year's race. This year, Dick has repowered the Duperdussin with an O.S. 108 and has made other modifications so that the plane will be more competitive. Dick did a great job last year, but lost out because his scale target speed was 10mph! To give the older models a fair shot at the speed trials, the Schneider Committee has increased the minimum speed to 30mph.

This is the quiet before the storm. All the Schneider Race entrants have their fingers crossed and their eyes on the prize, and *MAN* will have a report on the event as soon as possible.

That's all for this month. For me, the Schneider Race has become all-consuming. There's still a pile of photos on my desk, and I'll have to ask for just a little patience from those who were thoughtful enough to send them. Maybe things will return to normal when I'm back from Lake Havasu and kit the "Beast"! (Fat chance!)

● *Above: Here's Bill Curry with his 1931 Bernard HV220. The giant-scale Schneider entry is powered by a Super Tigre twin, and it weighs 32 pounds.* ● *Below: Dick Skogland's 1913 Duperdussin is a veteran of the '89 Schneider Race. It has a new engine for the '90 meet.*

THE SCHNEIDER CORNER

As I write, 10 days remain before the Schneider Race at Lake Havasu. Mike Johnson and I have tested the Savoia's Zenoah* in the plane, and it has produced 6,000rpm using two 20x10 modified props with 28 pounds of static thrust. The sound of the G62 on a tuned pipe, and the sight of the two props spinning in almost invisible discs, is nothing less than terrifying!

Owing to the scale configuration of the Savoia's float bottoms, it porpoised during its taxi trials. Because of a slight belly in the forward-rocker area, the float's lowest point is ahead of the step when planing. We can control the oscillations with elevator, but not being able to let the Savoia run free on step is a drag. The plane has left the water for a couple nanoseconds, and there hasn't been any evidence of tip stall or adverse torque caused by the two props spinning in the same direction. The Savoia is back in the shop for inspection. The front-shaft extension has developed play at the coupler (we'll drill and pin it), and the tuned-pipe coupler is loose, so we'll have to cinch it down. Other than that, we're ready to take to the air.

Here are the addresses that are pertinent to this article:
Byron Originals, *P.O. Box 279, Ida Grove, IA 51445.*
Saito; *distributed by United Model Dist., 301 Holbrook Dr., Wheeling, IL 60090.*
Scale Model Research, *2332 Ticondera Way, Costa Mesa, CA 92626.*
K&B Mfg., *12152 Woodruff Ave., Downey, CA 90241.*
Master Airscrew; *distributed by Windsor Propeller Co., 384 Tesconi Ct., Santa Rosa, CA 95401.*
Sullivan Float Products, *1421 2nd St., Calistoga, CA 94515.*
JR Propo Radio; *distributed by Hobby Dynamics, P.O. Box 3726, Champaign, IL 61826.*
Northwest Float Flyer, *Ed Westwood, Editor, 909 S. 173rd, Spanaway, WA 98387.*
Zenoah; *distributed by World Engines, 8960 Rossash Ave., Cincinnati, OH 45236.* ■

1990

Scale PBM-5A amphibian editors' choice

MODEL AIRPLANE NEWS

"PILOT PROJECTS" WINNER

WE'VE CHOSEN our 1990 winner!—and it wasn't easy. We've awarded $500 to Edward J. Zemaitis of Harrisburg, PA, for his beautiful Martin "Mariner" PBM-5A amphibian. Ed has been building model airplanes since 1933, and his PBM-5A prevailed in a highly competitive contest judged by *Model Airplane News* editors.

Powered by two 4-stroke Saito 80s, this 1/12-scale masterpiece has a wingspan of 118 inches, is 80 inches long and weighs 28 pounds. To date, it has flown two short hops: once off the Sussquehanna River at Fort Hunter, and once at the '90 West Shore Flying Society Giant Scale Classic. Flight testing will continue this spring, but it has already won several awards at modeling shows.

Started in February '87, the plane took two years to build and six months to paint and finish. (Ed estimates that he spent more than 2,000 hours on it.) Ed based his scratch-built ship on three-views from the Naval Institute in Washington, D.C., and on photos of the last intact PBM-5A in the U.S., which is being restored in Pima, AZ, by the Smithsonian.

by TOM ATWOOD

THE WINNING PLANE'S FEATURES

The plane has no water rudder, so its engines operate independently with the use of a 7-channel radio. Each engine uses two servos with spring-loaded linkages—one for for normal flight and the other for auxiliary, independent throttle control. The plane has a total of 11 standard-size Futaba servos powered by a 1200mAh battery. As well as the four for the engines, there are two for the flaps, two for the ailerons, one for the elevator, one for the rudder and one for nose wheel. (The last two are synchronized with a Y-connector.)

The use of continuous hinge pins allows the removal of all control surfaces. A silicone seal is used in the wing saddle for water flying, and watertight covers seal the hull when the side wheels are folded up. Conversion from land to marine capability takes only five minutes.

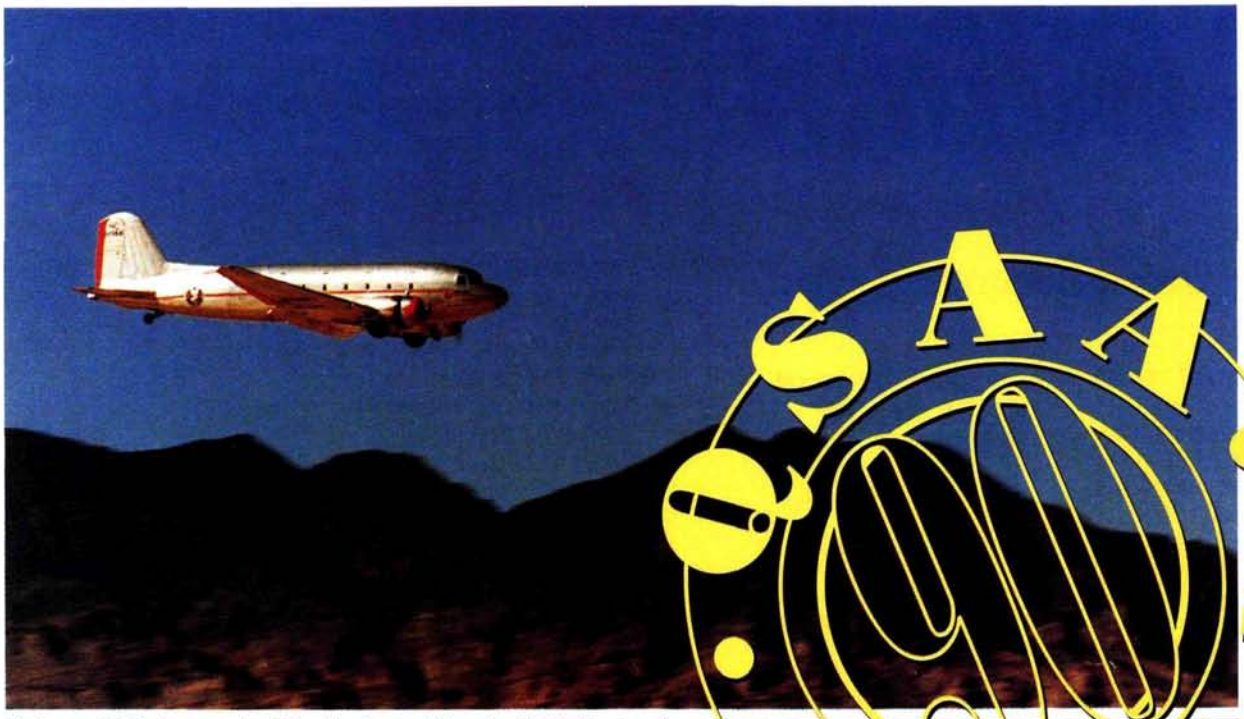
CONSTRUCTION

The nose-to-wheel-well area is a platform construction, and a box construction is used just forward of the wheels to the beginning of the tail boom. A crutch supports the tail boom, and plywood and balsa bulkheads are used internally. In the nose, there's a piece of 10x4x17-inch Styrofoam for flotation, and this is also used for the wing tips, the radome and parts of the engine nacelles.

Ed hand-planked the 1/8-inch sheet-balsa hull, and he sanded and glassed it using 3/4-ounce K&B glass-cloth and Safe-T-Poxy. Three coats of K&B primer and two coats of K&B satin top off the finish. The canopy is made of 46 pieces of Plexiglas. The tail turret and the turtle deck are translucent fiberglass made of 3/4-ounce K&B cloth and casting resin. The plane is detailed with authentic colors and markings.

Ed offers plans and 32 construction photos (complete with paint chips) for $75 (plus $5 for S&H in the U.S.). If you're interested, write to him at: 3784 Elder Rd., Harrisburg, PA 17111.

Ed's next project?—to enlarge his garage; he's running out of modeling space! ■



Andreas Gietz built and flew this 40-pound DC-3 DST (the first DC-3 bought by American Airlines). Powered by two 26cc O.S. 4-stroke flat twins, it has a 15-foot wingspan and took approximately six months to build.

Below: Well-known builder/designer Claude McCulloch of Montezuma, IA, flew this Waco S3HD-A. Dressed in Cuban colors, it's a one-of-a-kind model.

Bruce Scales of Palmdale, CA, flew this unusual model of a Russian ANT-25. The 16-foot-span model weighs 25 pounds and is powered by a Quadra 35. The original full-size plane flew from Russia to California in the '30s.

PHOTOS BY DICK PHILLIPS

Giant-scale models of special interest marked this year's meet

by DICK PHILLIPS

WHAT'S BIG AND beautiful and takes place in a Nevada desert? If you don't know, you either haven't been involved with large models for long, or you haven't been paying attention.

Every October since 1977, the Quarter Scale Association of America (QSAA) has held its big, beautiful Rally in a Nevada desert. Of course, it wasn't as big or as colorful in 1977 as it is now. Back then, the late Eddy Morgan got the ball rolling, and even with all his enthusiasm for large models, I bet he never thought the Rally would become so large.

This 27.5-foot-span Voyager was built by Don Westergren of La Mesa, CA. The 48.5-pound model was powered by an Enya 90 (in the front) and an O.S. 1.2 (in the rear). The plane flew, but it crashed shortly after takeoff.

A FLYING OASIS

For a few days each year, a dry lake bed about 20 miles east of Las Vegas (toward Lake Mead) becomes a small city of fliers and manufacturers who display and sell their wares. The flat lake-bed floor is approximately 5 miles wide and 10 miles long—large enough to be a full-scale airport! In fact, several full-size airplanes always land at the Rally. Visibility is usually superb, and this year's event was blessed with perfect weather—no wind, no dust, no rain.

There were five flight lines, and they always seemed long. For many pilots, waiting a couple of hours to fly was tedious, but for spectators, the days were filled with interesting airplanes, exciting flights and only a few crashes.

Although the Rally isn't really a contest, trophies are awarded, and the way recipients are chosen is unique: the registered pilots vote for the models in a variety of categories. For the winners, receiving such recognition from their peers is meaningful.

EUROPEAN ENTRANTS

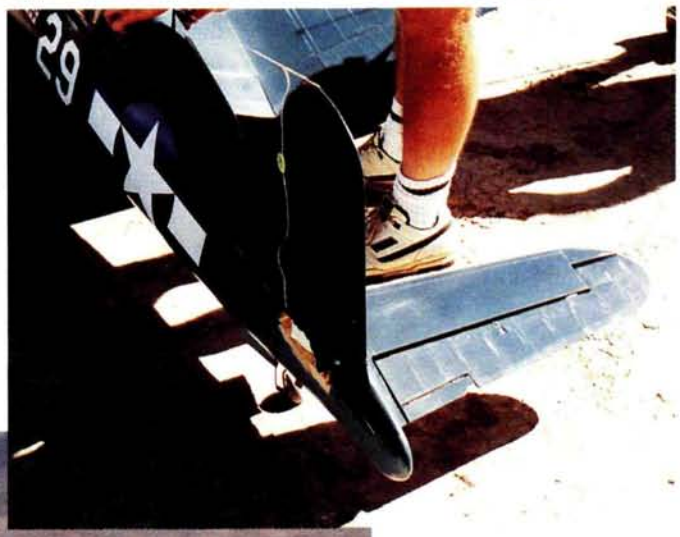
There are usually several interesting models from overseas, and this year was no exception. There was a striking model of a DC-3 from Germany, and a SAAB 340 from Switzerland.

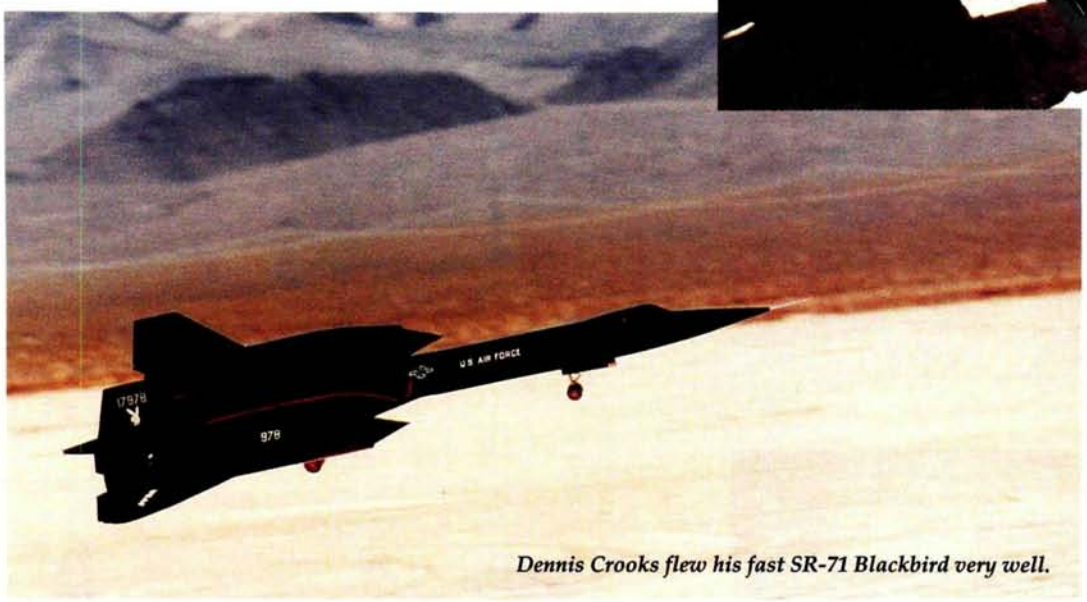
■ *Top left and bottom left: Henri Wild of Switzerland built this 14.3-foot, 81-pound model of a SAAB 340. It's powered by two 60cc 2-stroke engines and, like the original, it's constructed mostly of composites. The model has been flown in Switzerland, France, Sweden and the U.S.* ■ *Top right: Andreas Gietz taxis out his DC-3 DST.* ■ *Bottom right: Dennis Crooks' SR-71 Blackbird.*

The DC-3 was built and flown by Andreas Gietz, a young engineering student from Karlsruhe, Germany. It was his second version, and he spent about six months building it. The 40-pound model had a 15-foot-plus wingspan and was powered by a pair of 26cc O.S. 4-stroke flat twins, which moved the large, yet comparatively light plane with considerable authority. Andreas flew it one evening, just before dusk. Fitted with a complete set of flight and landing lights, it typified the incredible realism that's possible with today's large models. The only thing missing was the throaty roar of the full-size DC-3's radials. (In fact, both European models were exceptionally quiet. The noise regulations in Europe are much stricter than those in the U.S.) The DC-3 was voted Best of Show—a very popular decision.

Henri Wilds' SAAB 340.

This Corsair lost half of its stab/elevator during flight and wandered over the spectators. Pilot Rick Maida of San Jose, CA, did a superb job recovering control and landing without damage.





Dennis Crooks flew his fast SR-71 Blackbird very well.

It depicts the first of its type to go into service with American Airlines, and the airline sponsored Andreas' trip to the Rally. (They covered his airfare but not the $1,100 it cost to transport the model!) Andreas also showed off his impressive hand-built V-12 engine, which he demonstrated on several occasions.

The other outstanding European model came from Switzerland with its builder and his wife. Henri Wild is no stranger to large models. Before tackling the SAAB 340, he and his wife, Mireille, built two 1/2-scale Cosmic Winds, an AT-6D, a P-51, an F4U Corsair and a P-38 Lightning (all in 1/4 scale).

With a wingspan of just over 14 feet, the SAAB is the largest model they've ever built. Powered by a pair of 60cc 2-stroke engines, it weighs a tad over 81 pounds, has retracts and is capable of speeds up to 85mph. In the air, this striking model looks like a full-size plane, and even on the ground, its four-blade props are realistic. The model is of an airplane flown by Crossair, and when the president of the airline saw it, he invited Henri and Mireille to attend the QSAA Rally.

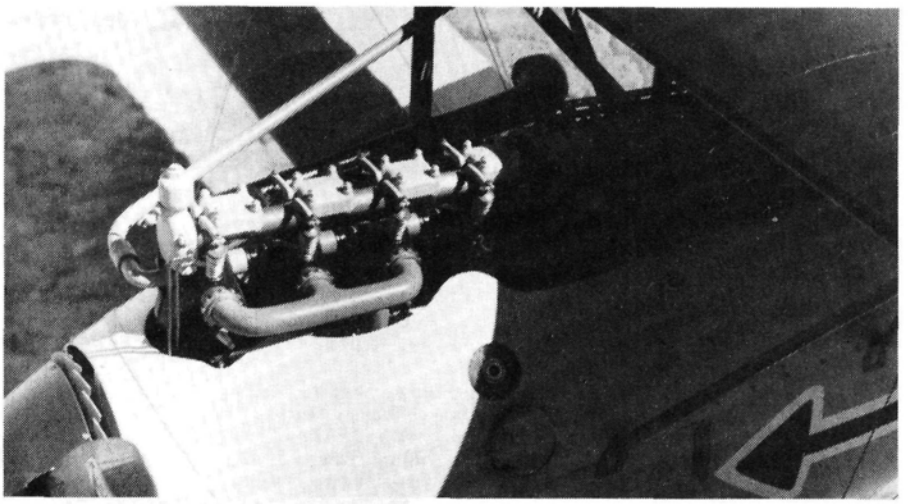
The model has been flown in Alsace, France (where it had to pass inspection by the French equivalent of the FAA) and in Sweden at the Aircraft Division of the SAAB factory. SAAB's management was impressed and said they'd finance a scale model of the new SAAB 2000 aircraft. Henri isn't sure he can find the time. (I'm sure we can sympathize with *that* problem!)

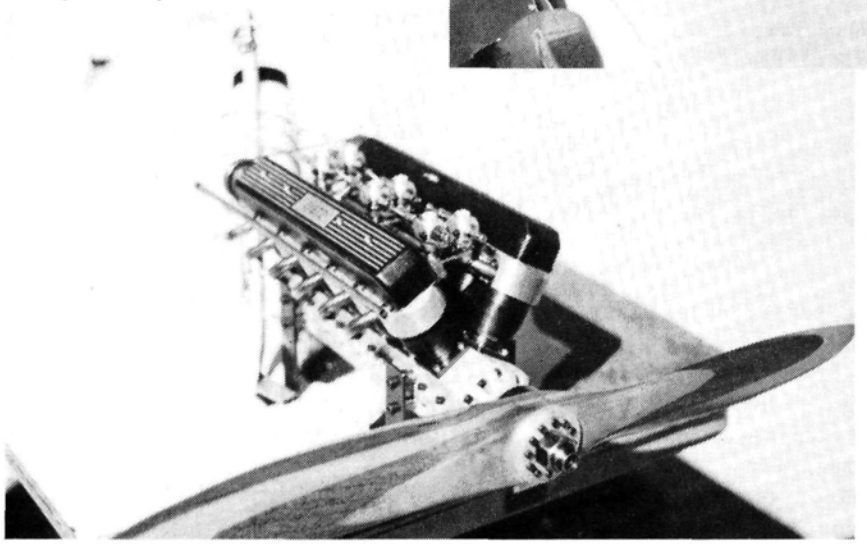
The 340's construction is unique.

Most of its fuselage was made of solid polystyrene profiles that had been cut from solid blocks. After it had been assembled and coated with glass-cloth and a special resin, it was covered with light plywood, which was also finished with light glass-cloth. Then, the polystyrene was removed from the inside, leaving a strong 30mm-thick skin. Although the 340 is large, it can be disassembled into four parts that fit into a station wagon. This realistic SAAB was voted Best of Multi-Engined Models.

Right: The workmanship on this dummy engine is a good example of the outstanding detail on some of the models. The fan blades behind the spinner are for additional engine cooling.

Below: Hand-built by Andreas Gietz of Karlsruhe, Germany, the workmanship of this V-12 engine was exquisite. Andreas demonstrated it several times during the Rally.





BORN IN THE U.S.A.

The two European models were outstanding, but the quality and originality of the North American models were impressive, too. Don Westergren and Paul Ross have built two Voyager models. Their original was a research project, and it was never intended to fly. It now hangs in the entry hall of the San Diego Aerospace Museum.

The second Voyager was at the Rally. Unfortunately, it requires a very long takeoff run and is difficult to fly. When almost out of sight, it pitched upward, performed a stately pirouette on a wing tip and fell to the desert ground. The damage wasn't serious. (Apparently, the full-size Voyager wasn't easy to fly either, and a member of the plane's design team tried to talk Don out of building it! Don incorporated gyros and gyro-controlled surfaces, but they weren't enough to prevent the accident at the Rally.)

The 48½-pound Voyager's 27.5-foot wingspan is impressive, and its workmanship is outstanding. It has an Enya .90 in the front and a O.S. 1.2 Surpass in the rear. Its front engine can be shut down while the plane is flying, and its propeller can be feathered to decrease drag. Don's Voyager received the Best of Scale Trophy.

Dennis Crooks' (Big Rock, IL) SR-71 was a real performer. Although Dennis is an expert flier, he decided not to make a demo flight on Friday, because the plane had some problems. One of its throttles had lost a screw, and the throttle barrel had loosened, but it was voted the Best Jet of the Rally.

EXTRAORDINARY PLANES

In addition to the usual P-51s, J-3 Cubs and Pitts, there was an unusual model of a between-the-wars, long-distance Russian monoplane—the ANT-25. The original, full-size plane, which was distinguished by its single engine and large wingspan, flew from Russia to California by way of Canada before over-the-pole flights were common. Flown by Bruce Scales of Palmdale, CA, the 25-pound model had a 16-foot span. It was powered by a Q-35, and it had made six flights before being brought to the Rally.

Long-time scale devotee Claude McCulloch of Montezuma, IA, brought two unusual airplanes. His trike-geared Waco biplane had been at the Rally before but, owing to a serious crash, it won't be back. Claude admitted that he flew the plane too far

(Continued on page 118)

SPORTY SCALE

TECHNIQUES

by FRANK TIANO

SHOP TALK

THOSE OF YOU with an attention span longer than a glow-plug element may remember that last month, I showed you a picture of a neat-looking Beech Super 18. You may also recall that I was saving the description of this beauty for this month's column. This airplane says a lot for the argument that a model doesn't have to be big to be awesome. Jerry Burpee built the little Beech from RCM plans, circa 1969. It spans just 58 inches, weighs 7 pounds and has a wing loading of 34 ounces per square foot. No, Jerry hasn't flown it yet, but he has completed some test glides and a couple of "floats." A float occurs when you make a fast taxi that prematurely puts the ship into the air. Then you chop the throttle and grab a handful of up-elevator! Anyway, it survived. Jerry sent me a picture of the full-scale plane, which I'm told just appeared in the December '90 issue of *Air Progress*.

Above: Jerry Burpee and the small Beech. Only five channels were used. Flaps work with throttle—low throttle, flaps down. Two O.S. .26 engines were used.

Right: Does this look real, or what?! David Hayes of Roanoke Rapids, NC, built this 78-inch O.S. 91 Surpass-powered Crop Duster. The spraying system worked flawlessly every time!

SCALE-MODEL WORKSHOP

Major Atwood sent me a letter from a reader who wanted information on how to set up a scale-model workshop. Other than the obvious hand tools, sandpaper, pins, etc., a scale-model workshop can be outfitted in different ways: you can do a utilitarian thing—just the bare essentials; you can go a little further and invest in some nice tools; or you can go way off the deep end and turn your half of the master bedroom and your part of the two-car garage into a full-blown "super shop"!

A BASIC SHOP

With scale models, you copy the lines of a real subject and, sometimes, it has straight lines and curves where you wish there weren't any. You become a master counterfeiter! For this, you'll need a sturdy, perfectly level workbench on top of which you'll put a 1/4-inch piece of plate glass to act as a building board. Rather than pinning parts to a soft wooden door, you'll glue them directly to the glass. You'll need straightedges, triangles, a good set of French curves, good knives with an ample supply of new blades, an assortment of sanding blocks, a Robart Super Stand, at least one of those 30-drawer parts cabinets and lots of fluorescent light. Basic tools should include a variable-speed drill, a heat gun, a soldering iron, a wire bender, at least one Dremel variable-speed Moto-tool, a Miller spray outfit, a Dremel scroll saw and a small vacuum cleaner.

A BETTER SHOP

If you have a few bucks squirrelled away, here are a few more things for your shop. Fit your workbench with a good set of casters so that you can wheel it around when you want to move it. Other upgrades include a small belt sander with a 4x36-inch belt, a Sears band saw, an inexpensive shop vacuum, another Dremel Moto-tool with a Robart

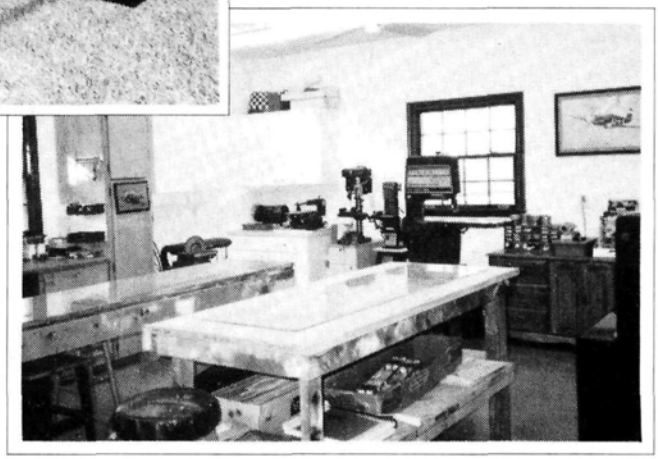
(Continued on page 66)

SPORTY SCALE

(Continued from page 64)

Left: Maury Maroney of Hanford, CA, did a spectacular job of covering his Platt P-51D Mustang with Coverite's Presto aluminum covering. It weighs only 19 1/2 pounds, and it's powered by a Super Tigre 2500.

Below: The ideal setup: two workbenches, a shelf underneath for scrap balsa, a band saw, a sander, a grinder, a drill press, a vertical belt sander, a scroll saw, a rolling toolbox and plenty of cabinet space. Notice the plate glass on both benches. The pictures on the wall add a nice touch.



right-angle drive attachment installed, a Sears air compressor that puts out 100 pounds of pressure, a Binks touch-up gun and paint spray gun, a Black and Decker cordless drill (model no. 9020), a drill press, a couple of filing cabinets for your documentation and other scale data, a box to hold balsa, at least one cabinet for storing engines and radios, and a 2x4-foot piece of pegboard on which to hang things.

THE BEST SHOP

When you hit the lottery, head to the nearest mall and buy a Sears 6x48-inch belt sander, a small, 7 1/2-inch circular saw, a couple of wooden storage cabinets with counter tops, a bench grinder, a light-duty torch, a small set of bookshelves and an air conditioner! Now you can make just about anything, once you set your mind to it!

SHOP HEAVEN

Just in case you win another lottery, you can still go further. First, buy a good lathe and a nice milling machine. With this equipment, no job is intimidating. Then grab yourself another band saw, install a special metal cutting blade, and use this saw for aluminum cutting only. Run back to the mall, buy a big air compressor, and install a few air jacks in strategic locations. While you're at it, latch onto a rolling tool cabinet, a 16-inch scroll saw and an exhaust fan.

Finally, have a phone installed (with your own private number, of course) and put a 15-inch color TV on top of those filing cabinets. If you really want to go nuts, hook-up a couple of shop vacs to your sander and wood-cutting band saw so that they come on automatically with the tools. It's always fun to dream, isn't it? It took me 25 years to get my dream shop, and I'm really proud of it; in fact, it's so nice that I almost hate to work in it and mess it up!

CHEERS

Once in a while, a product comes along that is so darn nice that I just have to tell everybody about it. Presto is one such product, and it's the brainchild of Art Kramer, who is the proprietor of Coverite* (one of the leading manufacturers of covering materials). Presto is a self-stick covering that looks and feels just like aluminum. It's more reflective than Coverite's Micafilm but not as mirror-like as Top Flite's chrome MonoKote*. It takes burnishing and steel wool really well, and most enamel-based paints will stick to it. Best of all, it's the most realistic aluminum substitute I've ever seen. For an all-balsa airplane, I suggest that you fiberglass, fill and finish the surface, then apply the Presto, which will lie flat. It takes a little practice to work it around curves, but a heat gun really helps. Try it; you'll enjoy it.

ROOKIE

This story proves that a novice in scale competition can do well without devoting a lifetime to practicing. My friend Jeff Foley met fellow modeler David Hayes, who lives nearby. What a bonus—two modelers in the same area sharing the same interest. Jeff usually does quite well in any form of scale competition. David asked Jeff how it's done, and Jeff told him to pick an airplane that he likes, build it carefully and true, document it well, paint it accurately, practice flying it, and then practice flying it some more.

David built a crop duster, painted it the colors of a full-size one that he saw at a local airport and flew it repeatedly. Then he entered a Masters Regional and qualified for the final. He and Jeff went to the final and, with Jeff doing the calling, David came away with a 16th-place finish out of 75! Now, that deserves a cheer or two, and it certainly proves my point: if you want it badly enough, go for it! All it takes is commitment and practice.

Well, that's it for this month. The Top Gun fie' l is now complete; we have about 50 pilots in Expert and 10 in Team Scale. For more details, check out the ad in this issue. Next month, I'll tell you about who you can expect to see at Top Gun and what they'll be flying. Until next time, keep checkin' that six.

**Here are the addresses of the companies mentioned in this article:*

***Coverite,** 420 Babylon Rd., Horsham, PA 19044.*

***MonoKote;** distributed by Top Flite, 2635 S. Wabash Ave., Chicago, IL 60616.* ■

A durable, good performer with nice scale appearance

GREAT PLANES

PHOTOS BY RICH URAVITCH & TIM DiPERI

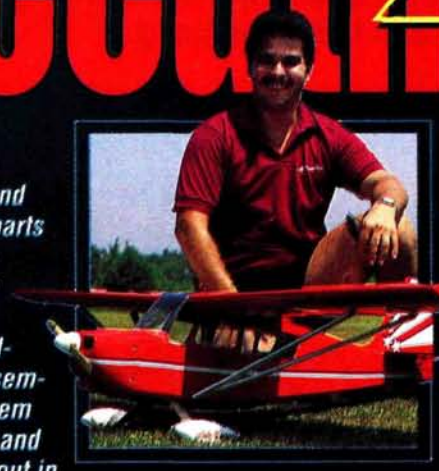
SUPER Decathlon 40

by TIM DiPERI

LAST YEAR, I devoted most of my "hobby time" to R/C helicopter flying, so the Great Planes* Super Decathlon 40 was a refreshing change. It's a real builder's kit, and I usually bolt my models together.

SPECIFICATIONS

- **Type:** Sport/stand-off scale
- **Wingspan:** 64 inches
- **Weight:** 5.90 pounds
- **Wing Area:** 654.5 square inches
- **Wing Loading:** 6.93 ounces per square inch
- **Power Req'd:** .40 to .50 2-stroke; .60 4-stroke
- **No. of Channels Req'd:** 4 (aileron, rudder, elevator and throttle)
- **Sug. Retail:** $99.95
- **Features:** wheel pants; plastic, vacu-formed window and high-quality wood.
- **Comments:** this classic built-up kit offers a durable, fun-flying airplane with a nice scale appearance.

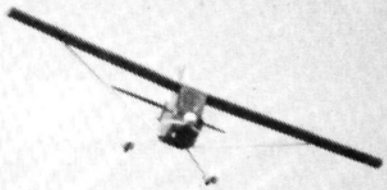


THE KIT

The plywood and balsa die-cut parts were of an excellent quality and required very little sanding. To aid assembly, most of them are numbered and clearly called out in the instruction manual. The other wooden parts (stringers, sheeting, etc.) were also good, and none was warped or twisted. All except the wing struts were light and relatively easy to cut and sand.

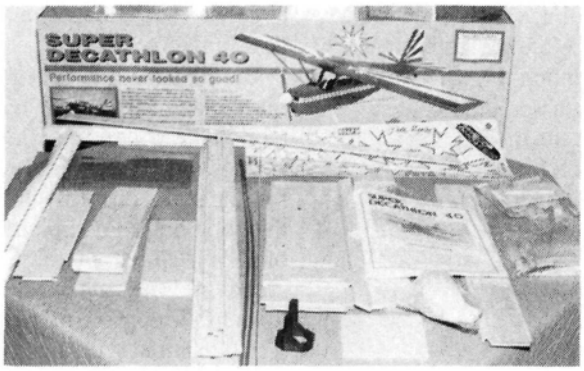
The kit includes many of the accessories you'll need. The engine cowl and wheel parts are of white, vacu-formed, ABS plastic, and there are clear, die-cut, plastic side windows, which must be glued to the fuselage after covering. Owing to its compound curves, the front window is made of a fairly thick, clear, vacu-formed polycarbonate. (This is a heck of a lot better than having to bend a sheet of plastic around those curves.) Two plastic bags hold a variety of

Decathlon



hardware and some special machine-cut wood.

The two rolled plan sheets have full-size construction drawings. One sheet is devoted to the wing and gives a clear, three-view presentation of its assembly. The fuselage plan sheet parallels this on one side, but on the other side, there's a complete full-size pattern for the white trim you'll need to make a Decathlon like the one shown on the box. A high-quality set of decals that includes the three-star pattern takes the hard work out of trimming.



The kit-box contents shows this plane is of the traditional built-up variety. High-quality balsa stock is used.

The well-written, well-organized 45-page assembly manual contains more than 100 photos and several line drawings. The assembly steps are detailed carefully, and each is accompanied by good black-and-white photos.

CONSTRUCTION

The empennage. Most of the tail is made of 1/4x1/2-inch balsa sticks that are cut to the size shown on the plans. I used white glue to assemble the tail surfaces and CA to "tack" all the joints. After the glue had set, I sanded each surface, installed the tail wheel and joined the two elevator halves. Both the rudder (where the tail-wheel wire was glued) and the elevator (where the halves were joined) received special attention: I saturated the stress points with CA.

Building the fuselage. The fuselage has a basic, box-like construction. First, join the three pieces of die-cut balsa along the square dovetail joints. I would have preferred fuselage sides made of a single piece of wood, but they probably wouldn't have fit into the kit's box.

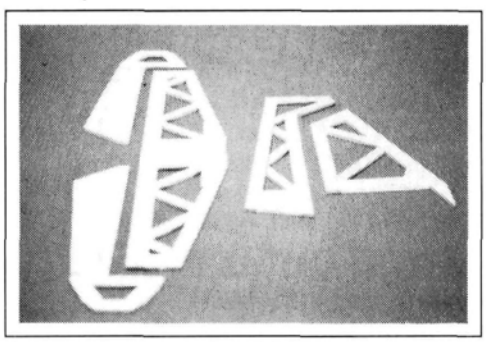
At this point, I had to take the right thrust into account. I defined the left and right sides, and then, following the instructions, I laminated the plywood fuselage doublers to yield several degrees of right thrust. I then installed two of the main bulkheads and the basic top and bottom plywood formers, and I glued in the rest of the tail-end bulkheads.

Underneath the fuselage, I trimmed the bulkheads to accommodate 1/2-inch triangular stringers for each side. Later, I sanded these to shape so that I could sheet the bottom of the fuselage with balsa.

The landing-gear platform area is a 1/4-inch plywood sheet that's epoxied into the fuselage. Don't be stingy with the glue in this high-stress area. The landing gear is made of a piece of formed aluminum in which four mounting holes must be drilled.

Next, on the forward part of the fuselage, I wrapped 1/16-inch balsa around the top and bottom bulkheads. After cracking two pieces of wood, I decided to follow the instructions and soak the wood in warm water and alcohol for 10 minutes. After that, I felt as if I could have wrapped a golf ball with that sheeting, and I successfully sheeted the bulkheads, using white glue and CA.

"The assembly steps are detailed carefully, and each is accompanied by good black-and-white photos."



Here are the tail feathers laid out.

To erect the top of the fuselage, glue the top formers to the bottom bulkheads. Then glue a set of plywood cabin sides and some of the newly erected top formers to the fuselage sides. With sheeting, a 1/2-inch triangular stringer creates the appropriate aircraft lines.

At this point, I fuelproofed the fuel-tank compartment with polyester resin to increase strength and prevent the wood from absorbing oil.

The engine mount. The plans describe in detail two suitable engine configurations:

- 4-stroke: bolt the mount to the firewall and then install the engine.
- 2-stroke: add a box-type firewall extension and mount the engine on it.

I chose the second method for my old K&B* .40, which had almost no time on it. After gluing the extension to the firewall, I added fiberglass cloth to the joint where the two pieces meet—just as a precaution. I then installed the

Decathlon

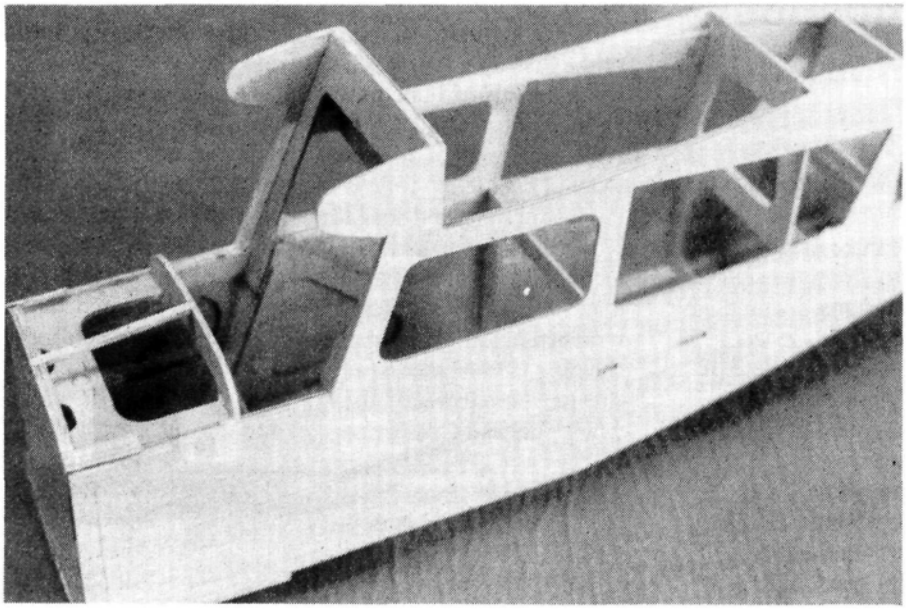
engine, the fuel line and the throttle pushrod.

Wing construction. The wing has a typical symmetrical airfoil. It was a pleasure to build, and I framed both panels in approximately 90 minutes. The notches in the inner leading and trailing edges helped me to position the ribs accurately. I didn't use a wing jig, but there are holes in the ribs to accommodate one. The leading and trailing edges were properly shaped and required very little sanding.

The instructions recommend that you fiberglass the center section after joining the wing poles. I was ready to use my polyester resin and decided to tack down one end of the glass-cloth with CA. Well—to make a long story even longer—I just kept going, and in 10 minutes the center section was completely fiberglassed.

On this particular model, the wing tips were quite easy to make because I only had to round off the end of a 1/4-inch rib slightly. (The instructions for making the traditional Decathlon wing tips were also included.) I expected "barn door"-type ailerons, so I was pleasantly surprised by the use of strip ailerons, which look cleaner and work better. Finally, I glued in the triangular pieces of plywood for the strut supports.

"The Super Decathlon .40 kit is well-engineered and well-planned."



The fuselage and cabin are built for strength and durability

FINAL ASSEMBLY & FINISHING

I chose to cover the Decathlon with red MonoKote*. The plane has no tight compound curves, so covering it wasn't complicated. Two rolls should have done it, but I wasn't very efficient and had to start a third one for the ailerons.

I had to trim and adjust the cowl to accommodate my engine. Then I rubbed it with steel wool and applied three coats of Formula-U* red paint, which matches the MonoKote perfectly. Instead of painting the wheel pants, I fiberglassed their centers (from the inside) and ran a 1/4-inch red strip of MonoKote around the outside of their center section. This was quick and looks neat.

Before permanently installing the cowl, I fuelproofed the firewall with 3-hour epoxy, and then I test-ran the engine.

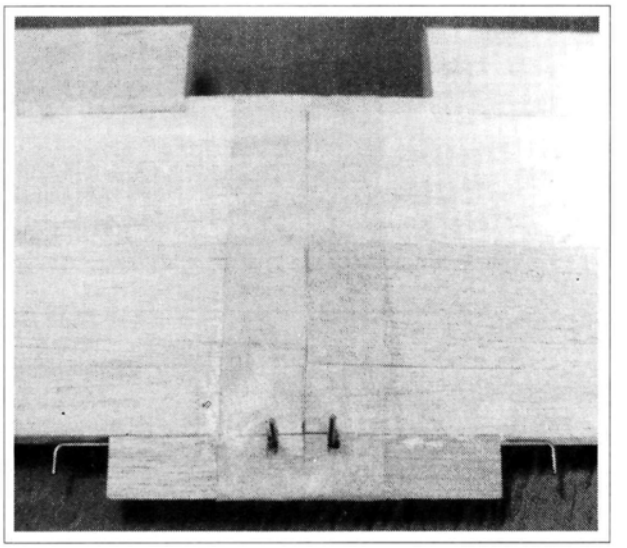
I chose a Slimline* muffler because it's small, and I had to remove only a small piece of the cowl for the exhaust. I carefully ensured that the spinner didn't rub against the front of the cowl and that I had adequate access to the fuel line.

Before installing the radio, I made wing struts, even though the wing is certainly strong enough without them. For the struts on each side of the wing, I used two pieces of hard stick balsa (1/4x3/4 inches and 1/4x1/2 inches, cut to length according to the plan). I started with the thicker, forward strut and drilled small holes at the ends to accommodate self-tapping sheet-metal screws, which go through the wood and into a nylon plate that you attach to the plane. I had to bend this plate to the correct angle where it's attached to the fuselage.

The fuselage must be slotted at the bottom so that the nylon plate can be inserted. I measured the strut to ensure it would meet the wing in the right place. After that, I attached a nylon strap to its other end, again using a self-tapping screw.

I installed the wing's rear supporting strut in the same way, but I had to angle it from the wing's trailing edge to meet and join the front strut at the fuselage. I did this by trial-and-error angle cutting, and cut-and-try length cutting. I fiberglassed the area where the two struts

join, and saturated the edges of the screw holes in the balsa with CA. After sanding the struts, I primed them and painted them with white acrylic lacquer.

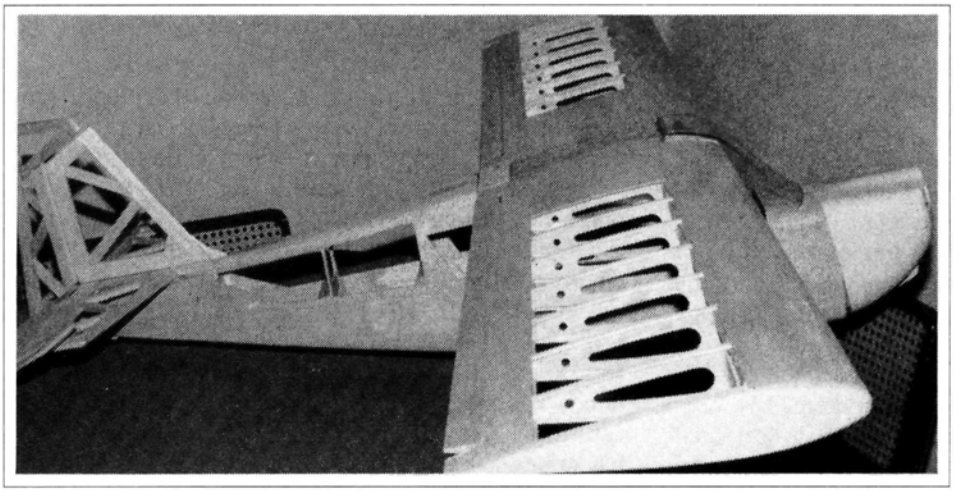


The author used CA when he reinforced the mid-wing with glass-cloth.

RADIO INSTALLATION

I installed three servos side by side in the fuselage. All the control surfaces are actuated by piano wire that has Z-bends at the servos. I opted to use a flexible Sullivan* Nyrod for the throttle linkage. The aileron servo fit right into the cut I had made in the wing. The piano-wire-to-aileron torque-rod technique is nice and clean.

For control, I chose a Futaba 6-channel PCM helicopter radio. For both "up" and "down," I only had to turn the tail-rotor mix to zero. After I had installed and tested the radio, I glued the side windows into place and seated the front window with clear silicone.



The Decathlon ready for covering.

PERFORMANCE

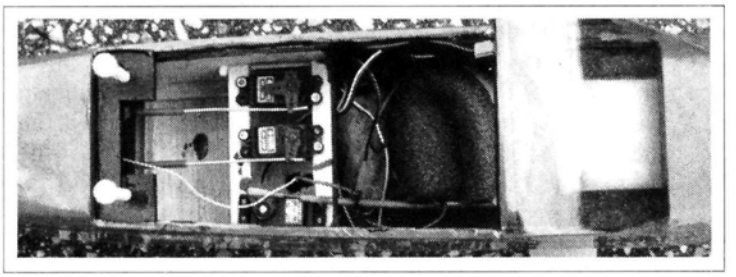
I hadn't applied Loctite* thread-locking compound to a nut that secures one of the landing-gear wheels, so my first attempt at flight resulted in some ground loops. (CA fixed it.)

Like most tail-draggers, the Decathlon behaved quite well on the ground as long as I held a little up-elevator. After taxiing around for a while, I powered up and took off. During its first flight, I found that the K&B .40 had more than enough power for it. I also discovered that my elevator and rudder settings were much too sensitive, while the ailerons weren't sensitive enough. After trimming, the airplane was very aerobatic.

On landing, the Decathlon was predictable and had no tendency to tip-stall. On my second landing, however, I tried to slow it too much, and about 6 inches before it touched down, it tip-stalled. I was happy that nothing was damaged during the first couple of flights. (I fly from grass and usually expect wheel pants to last for only one flight, but I had no problems.)

The Super Decathlon .40 is well-engineered and well-planned. I framed most of the airplane in about 20 hours; finishing it and installing the engine and the radio took another 10 hours.

Many accessories are included for the list price of approximately $100, and for about $250 (not including the cost of a radio), you can have a durable airplane with great performance and a very nice scale appearance. The Super Decathlon .40 is a winning addition to the Great Planes fleet.



The servos are mounted in the fuselage, under the wing saddle. There's plenty of room!

**Here are the addresses of the companies mentioned in this article:*
Great Planes Model Distributors, *1608 Interstate Dr., P.O. Box 4021, Champaign, IL 61820.*
K&B Mfg., *12152 Woodruff Ave., Downey, CA 90241.*
MonoKote; *distributed by Top Flite, 2635 S. Wabash Ave., Chicago, IL 60616.*
Formula-U; *Pactra/Plasti-Kote 1000 Lake Rd., Medina, OH 44256.*
Slimline Mfg., *P.O. Box 3295, Scottsdale, AZ 85257.*
Sullivan Products, *1 North Haven St., Baltimore, MD 21224.*
Futaba Corp. of America, *4 Studebaker, Irvine, CA 92718.*
Loctite Corp., *4450 Cranwood Ct., Cleveland, OH 44128.* ■

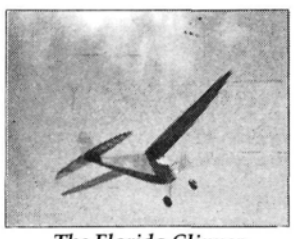
GOLDEN AGE
OF RADIO CONTROL

by HAL DEBOLT

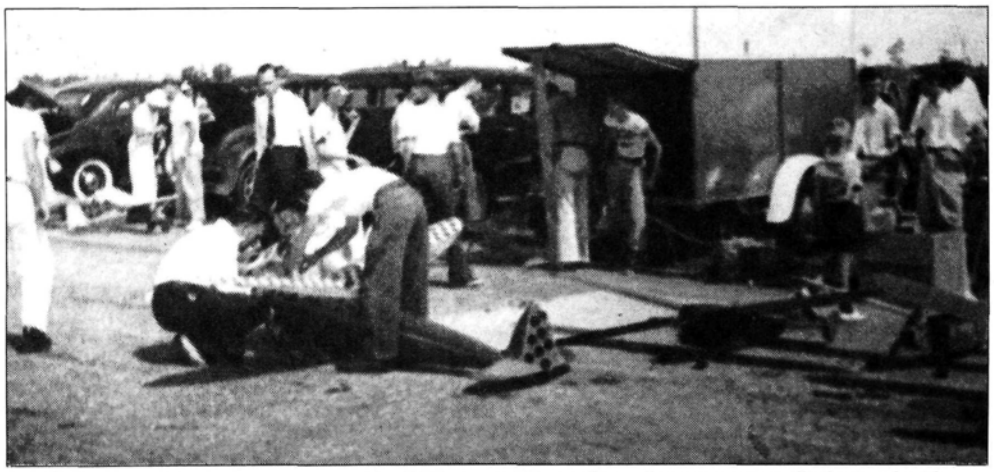
Come fly in Florida...

RETIRING TO FLORIDA is a wonderful idea for any R/C enthusiast; we have the best flying weather (every day, all year, mostly in the mornings), and the area is peopled by migrants from all over the USA and Canada. R/C club members are predominantly *retirees*—many OT fliers—who no longer allow work to interfere with their modeling! With this cross section of experienced R/Cers, the modeling scene in Florida is most enjoyable.

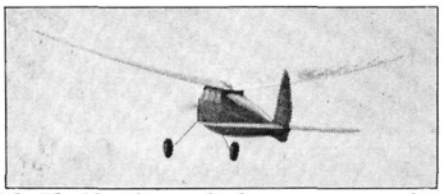
How and when did R/C flying start here? I've been lucky enough to meet Cecil Wethy of Miami, and he has a wealth of information on the subject. On leaving the service after WW II, Cecil bought a hobby shop, which he operated until his recent retirement. Initially, much of his trade was in free-flights like Comet Clippers and Zippers. He remembers that the most outstanding Zipper was powered by a Dennymite, not by the usual Brown Jr. It climbed vertically! Then C/L took over and, using an Arden .19, Cecil did well in Class A speed. (His 108 to 109 mph times earned him a national ranking.) He has some interesting memories from his teenage days.



The Florida Clipper.



Fred Stevens and company prepare the 1939 giant Clipper for a demonstration flight in Florida—possibly the first R/C in that state.



The Florida Clipper climbs away on one of its many demo flights.

PHILANTHROPY IN FLORIDA

It was the '30s, and in Miami, Fred Stevens, owner of the Acme Electric Co., decided to open a hobby shop division. Interested in model aircraft and young people, Fred would invite teenagers in off the streets to help him build models and introduce them to modeling. Like everywhere, times were tough and *we know* how youngsters were feeling the pinch. Fred's generosity led to a sky filled with free-flights!

In '39, this activity led to the desire for an R/C model. With all their Comet Clipper experience, it was logical that their search for an R/C design led them to enlarge the Clipper's span from 6 feet to 10 feet. (In retrospect, this idea was almost brilliant!)

Bill Watson, the hobby shop's manager, supervised the work of about 10 or 12 youngsters who were all eager to see an R/C plane perform. (You can imagine the chaos of this activity!) The rudder-only big Clipper was powered by a Forester .99 and used a vacuum-tube radio and escapement.

Cecil doesn't remember any other details, but says he enjoyed watching it fly. It was heavy and underpowered, so its performance wouldn't be impressive by today's standards, but anything radio-controlled was a marvel in those days! The R/C Clipper was demonstrated throughout the area and drew considerable admiration. (Remember, this was 1939.) Was this Florida's first R/C?

My local R/C club—the Valkyries of Manatee—has approximately 125 members, most of them retirees and many OT R/Cers. Dan Hensley gave me these clues to some R/C beginnings:

Dr. Good became interested in R/C in Michigan and then migrated to the D.C. area, which was ripe for R/C growth. With Don Clark, Al Diem, Maynard Hill and others, he added much to the D.C./RC group,

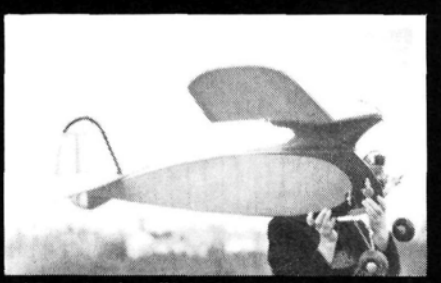
(Continued on page 76)

AN R/C PIONEER

Scale made an appearance in R/C early on. Chet's 1953 SE-5 flew well on rudder-only control.

Tom McCoy and Chet Lanzo were close friends, and when Chet died, Tom helped Peggy Lanzo to sort through Chet's R/C collection. Tom found a few unusual items.

First, he discovered that Chet must have been one of the first with R/C. An article in the April 12, 1935, "Cleveland Press" includes photos of Chet "tuning" his radio in a large model, obviously in readiness for a flight. The home-built radio had two controls: the first started and stopped a geared output motor that operated the rudder (with no particular sequence); the second operated another motor that moved a *weight* fore and aft in the fuselage (effectively changing the balance to cause a nose-up or nose-down flight). Apparently, at the time, Chet wasn't quite confident enough to use elevator control! The model was one of his Brown Jr.-powered, 12-foot-span Lanzo Racer free-flights, which he had converted to R/C.



R/C-assist free flight in 1939? Lanzo may have pointed the way with this pylon R/C.

Lanzo had to try all phases: this 1961 pattern bird uses reeds. Note the Taurus influence on the tail.

Another newspaper article tells of Chet using an elevator in a tall Cleveland office building to check the *altimeter* he had developed to control the altitude of his models. Talk about optimism!

One photo shows a 1939, 7-foot-span R/C model powered by an Ohlsson .60. It was rudder-only with a Lanzo radio and a Lanzo *servo*. This one was unique in that Chet flew it free-flight, and it only used R/C *after* its engine shut off at altitude. Under power, it had radio problems.

Another photo shows Chet with a refined version of his rudder-only '37 Nats winner. Powered by a .29 Forester, it had a 6-foot wingspan. Note the *hand-held* transmitter!

The last photo shows a 1961 shoulder-wing pattern design; it shows how Chet advanced in R/C. This was "full house" with FSM 8-channel reeds and a Torp .45 for power.

R/C pioneer Chet Lanzo's efforts contributed immeasurably to the development of model aviation.

Proud of his '37 victory, Chet produced this upgraded version in 1938. Note the hand-held transmitter!

GOLDEN AGE

(Continued from page 74)

which soon became one of America's premier R/C clubs. Across the Potomac, in Virginia, Dan Hensley's government work had taken him to Alexandria, and he saw a need for an R/C organization on the Virginia side of the river. Following the lead of the D.C./RC club, with Russ McLennon, he established the Northern Virginia R/C Club. Today, it's one of the area's most prestigious clubs.

THE ELECTRON

Dan has always been a visionary, and his first R/C design exemplifies his approach. In the late '40s, Rudder Bugs were popular, but Dan thought something "prettier" could do the job just as well. He called his answer the "Electron," and it first took to the air in 1949. As the photograph shows, compared with the free-flight styles of that period, the Electron looked really "clean." Dan used a Walt Good radio with Good's four-position escapement (its sequence could be maddening). Ham operator Stan Potter built the radio, and to help with the sequencing, he included a telephone dial on the transmitter.

The largest dry batteries we see today are the "Lantern batteries," but in the early days, *all* electronics made wide use of larger batteries with higher voltages. The Good radio used two 67 1/2V batteries (each about the size of a paperback book and very much heavier) and a 3V filament battery—starter-battery size. What a load for the model!

The Electron was powered by one of the latest front-rotor Ohlsson .23s, and its covering was a well-doped bed sheet! Dan says it was a docile, steady flier until he "retired" it in 1955 (a very long life for an R/C plane of that era!).

A young Dan Hensley displays his modern-looking 1949 R/C design, which flew well until Dan retired it in 1955.

NON-STOP MODELER

When we had the Navy Nats, each year, they were held in a different location, and the Northeast site was at Willow Grove, PA (Philly area), where Dan had his first experience of competing. Flying a Live Wire Senior (the first LW design) that he had "hopped-up" for competitions, he placed well in Rudder Only. As an entry-level R/C design, the Senior was usually powered by a .19, but Dan used a C-S radio and a K&B .35 engine. The big increase in power considerably increased the Senior's maneuverability; it would loop, roll and spin with the best.

In about 1967, Dan's work took him to New England, where he started the Freemont Flyers, which has grown into a formidable R/C organization.

Also in the area, Lou Andrews, who had left Guillow, was establishing his AAMCO R/C kit manufacturing company. Among his first offerings was the Aeromaster biplane, which was far ahead of its time. (Consider that the Ultimate bipe dominated last year's Tournament of Champions and is likely to do so again.) Lou needed exposure for his radically new bipe, so he enlisted the help of Ernie Huber and Dan Hensley, who agreed to "campaign" them on the contest circuit. The rest is history! With the Aeromaster, Ernie Huber made a name for himself, and he later went on to introduce R/C helicopters to the Hollywood scene. For several years, he also worked closely with Lou Andrews on airplane development.

At about this time, Dan came up with the idea of 1/8-scale, gas-powered cars, which he produced (on a modest scale) with his Autodyne Model Products Co. Could these have been the first commercially available R/C cars? Later on, the company produced a couple of sport/trainer R/C kits, and they were locally well-received.

After this, Dan was involved with Northeast Aerodynamics—a well-established supplier of kits—and now he has retired and is modeling here in Florida. Don't equate "retired" with "idle." Dan organized Sun Coast Hobbies, ran a hobby shop and now builds custom models. A recent effort is a very attractive .40-powered fun-fly style, which he put into production and sells *ready to fly!*

OOOPS!

Bob Benjamin (Olympia, WA) started his R/C activities in 1963 and wonders whether he qualifies as an OTer. His first plane was an LW Kitten, which he literally flew to pieces! Bob has developed his creative abilities, and I hope we'll be seeing some of his efforts in *MAN*. In his letter, Bob referred to my discussion of Min-X (July '90 issue) and noted that I describe Min-X pulse actuators as "Bellamatic units." They do resemble them, but he suggests that they were actually Rand actuators, which I had completely forgotten about. (We had so many brands and types of equipment compared with what's now available.)

See how your letters fill these pages with the most interesting OT R/C info? Isn't it time that you, too, became a part of this OT R/C place? ■

SMALL STEPS

by RANDY RANDOLPH

1990 Small-Scale Fly-In attracts over 100 planes

Jaime Colley and his clean, high-performance, motorized enduro sailplane.

THE THIRD ANNUAL Small Steps Fly-In for airplanes powered by engines with a smaller than .26ci displacement was held in Dallas, TX, on the weekend of October 13 and 14, 1990. Sponsored by *Model Airplane News*, the Small Model Airplane Lovers League (SMALL) and the Dallas R/C Club, it was one of three major modeling events held in the Dallas area last year.

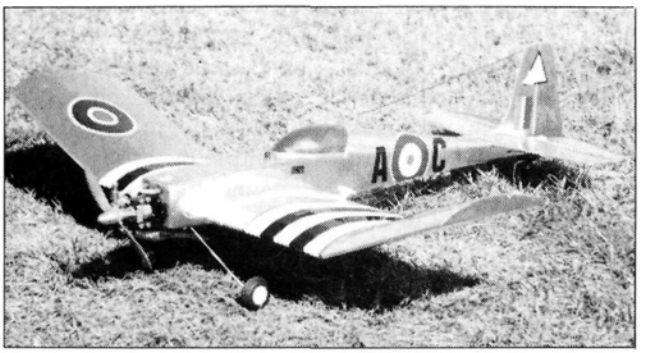
Slightly fewer attended this time—perhaps because it was held earlier and perhaps because of gas prices—but more than 100 airplanes were entered by modelers from three states. (Unfortunately, the flu kept Joe Wagner at home.)

During hundreds of flights, we saw only one airplane slightly damaged (on a hard landing). The CD, Eddie Williams, spent much of both days test-flying and trimming airplanes that made their first flights at the event, while Dallas R/C Club members looked after the transmitter impound and registration and cooked the best hamburgers in town.

As is the custom, all entrants were given a ballot to vote for the "Best All-Around Good Guy." (Each ballot was also an entry in a raffle for a new Cox Cobra radio system.) After much politicking and hand shaking, Emmett Fry of Little Rock, AR, won the beautiful Paul Guilland briar pipe for being the Good Guy, and Paul Kupersmith of Euless, TX (he actually voted for Emmett), won the Cobra.

The photos give some of the flavor of the weekend. There were flying wings, autogyros, canards, biplanes, multi-engine planes and even rocket planes. Of all the really beautiful small airplanes, one of the most impressive electrics was Jaime Colley's enduro

(Continued on page 78)

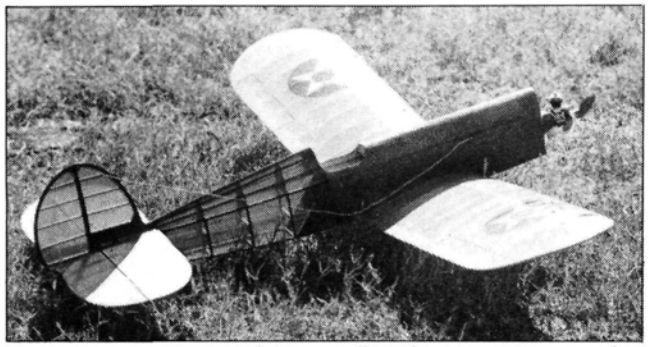


Tommy Day is sold on 2x4s. He and Steve Hart, his flying buddy, took several to the Fly-In; this low-wing version has an Enya .09 on its nose.

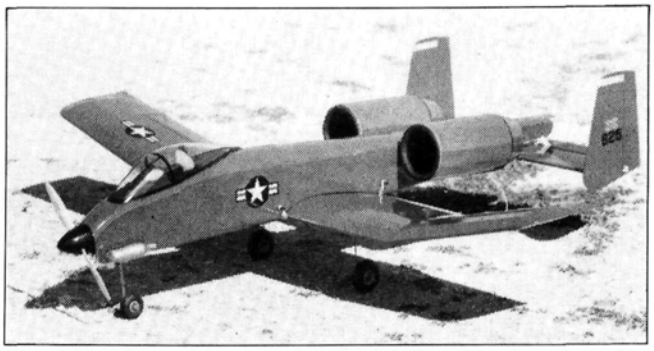
A member of the Dallas Electric Aircraft Flyers, Frank Korman launches his geared Astro Cobalt .035-powered Pietenpol. You'll now find electrics at most events.

SMALL STEPS

(Continued from page 77)



The youngest entrant, Dale Larsen, flew this Cox .049-powered P.T. Pursuit. Few things are as pretty as sunlight shining through transparent wings.



Steve Hart's Enya .19-powered A-10 with that ubiquitous 2x4 wing.

Sailplane. It was powered by an Astro 05 and designed around a Lynn Cromer fuselage, purely for duration. The darned thing would climb nearly out of sight on a motor run of 30 or 40 seconds. (Since it's a 6-footer, to get nearly out of sight it had to get very high indeed!) It would also do it at least four times on a single charge.

During the weekend before the Fly-In, Jaime and his team had kept his Enduro up for 3 hours, 56 minutes, during a 4-hour duration event. Electrics are relatively new, but they obviously have a place in the *small* scheme of things.

YOU GUESSED IT!

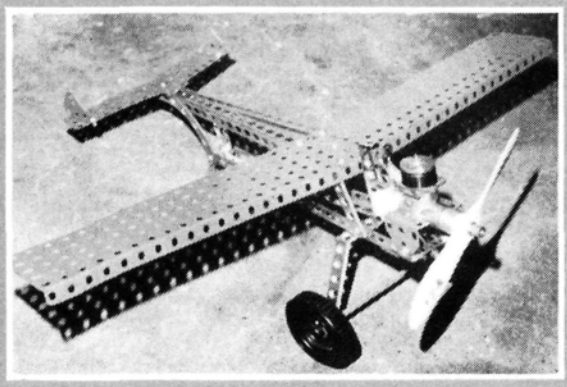
You responded well to the "guess-the-engine" challenge in my November '90 column. Yes, it *was* the Gilbert .07 and, as promised, I list the first 10 correct entrants and show a photograph of Lescher Dowling's airplane. The slanted intake was a giveaway, but it wouldn't have been fun if it had been too difficult. In the future, I'll make it a little more interesting by using a different approach and (I hope!) talking our editor into an occasional prize subscription.

By the way, if you haven't yet joined SMALL, do so now by placing your right hand over your heart and promising to build and enjoy small model airplanes. There are no rules and no dues, and you become an instant life member.

RETURNED TO SENDER

If ROBERT CHEANG of Kuala Lumpur, Malaysia, is wondering why I haven't responded to his letter, I'd like him to know that I did, but my response was returned by the Malaysian Post Office. Perhaps I didn't have his complete address. Robert, I'd like to send you the article you asked for, but you'll have to send me your complete address again. Better luck next time! ■

November '90

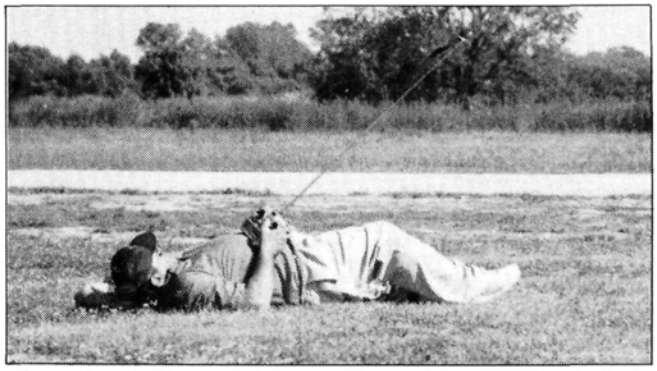


Mystery Engine

Not only did Lescher Dowling correctly identify the Gilbert engine, but he also sent this picture of his Gilbert mounted in an Erector Set airplane.

The first 10 correct engine spotters also include: Bob Kleinstuber, Robert Cheang, John Gill, Mario Borgatti, Bill Caldwell, Johnny Berlin, Jack Crutcher, Norm Johnson and Buddy Irwin.

Congratulations to all of you; let's see how you do *next* time.



If you thought the Small Steps Fly-In would be a laid-back affair, you were right! Don Downing, of Model Merchants fame, flies his .049-powered Klingberg Wing in a way that suits his ability and experience.

Hot WINGS

by DAN SANTICH

WING-TIP SMOKE from a full-size plane is really eye-catching; you can see it on Lasers, biplanes or jets at any air show. Once, at the Sussex County Air Show, I saw it on Leo's Laser, and it looked so good that I simply had to try it on a model.

The first plane I modified was the Knight Twister, which was featured in the October '85 issue of *MAN*. Because of its smoke, the Twister received a lot of attention at fly-ins; in fact, *MAN* Associate Editor Chris Chianelli remembered it so well that he asked me to write about my experiences.

This article won't teach you how to set up your engine to run a smoke system. It will, however,

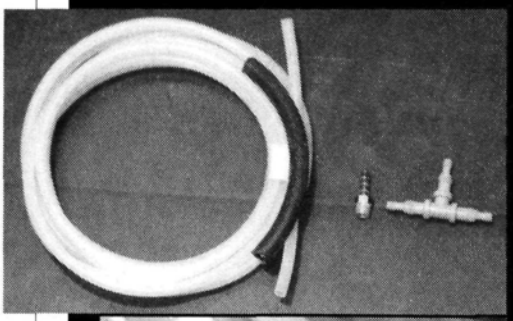
Getting your wings to smoke isn't teaching bad habits!

The Big Hots' wing-tip smoke gets everyone's attention!

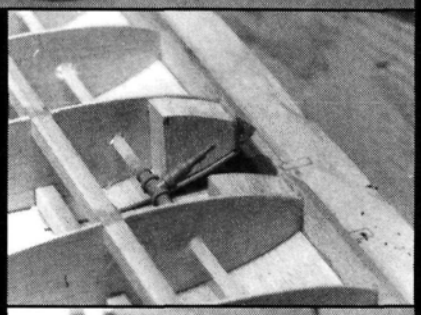
PHOTOS BY DAN SANTICH

WINGS

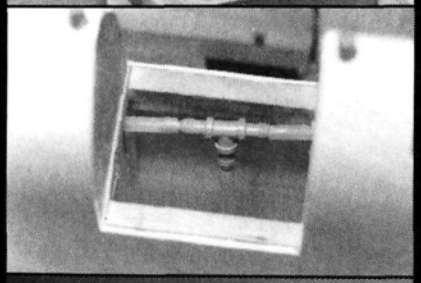
Here's the Big Hots producing smoke at full throttle.



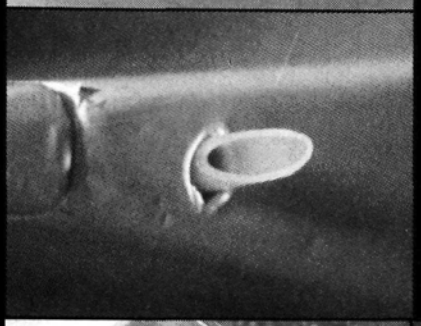
◀Notice that the metal fitting in the center is tapped into the exhaust. Use hardware that can handle high temperatures.



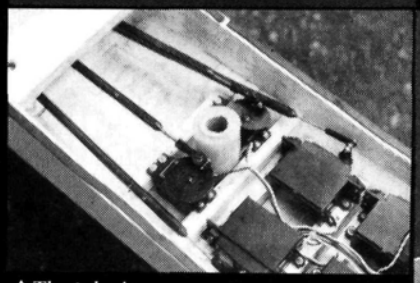
◀Install the tubes in the wing during construction. Notice the T-fitting.



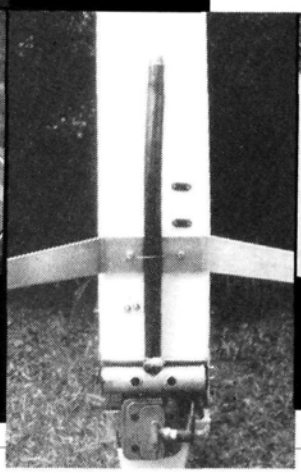
◀Here's a high-temperature T-fitting inside a wing.



◀Notice the tube's angle where it exits the wing tip.



▲The tube in the fuselage receives the fitting in the wing.



▶The high-temperature hose is supported by a wire clamp that's between the gear.

▲The fitting in the wing plugs into the fuselage.

show you a variety of engine/smoke-system setups and explain how the smoke is piped to the wings.

ENGINE SMOKE

Wing-tip smoke is created in the engine's exhaust system and then piped to the tips of the wings through plastic tubing. To produce the smoke, a special "smoke" fluid is pumped from a separate holding tank (any commercial fuel tank will work) and injected into the engine's exhaust chamber where it's heated. For smoke fluid, I've had good results with a 50:50 mixture of kerosene and diesel fuel. There are commercial smoke fluids available such as those sold by B&B* Specialties, which also sells highly efficient smoke pumps for gas engines. (I use one in the Big Hots for this article.)

The amount of smoke that a model engine can create is proportional to the amount of heat it can produce, and the method used to inject smoke fluid into an exhaust chamber is extremely important. Smoke-fluid pumps (electric or engine driven) usually work best. I don't recommend that you use direct engine pressure from the crankcase to pressurize your smoke-fluid tank, because it's inadequate.

Some folks think it's tough to get a 4-stroke glow engine to produce smoke, but that isn't true. With a 4-stroke glow engine, you have to preheat the smoke fluid just before you inject it into the engine exhaust. To do this, I wrap a piece of 1/8-inch brass tubing (through which the fluid will pass) around the exhaust tubes four or five times before it enters the muffler. To get the smoke fluid into the exhaust chamber, I use an electric fuel pump that's compatible with the fluid mixture.

WING-TIP SMOKE

Producing wing-tip smoke isn't very difficult. The most important thing to remember is that exhaust fumes are hot, and plastic tubing will melt if you run it too close to the exhaust. It's also important to make sure that all the tubing connections are tight, or your airplane will be saturated by diesel fuel and kerosene!

I tapped into my muffler and installed a third exhaust outlet (my Hots uses a Slimline* muffler that has two exhaust outlets). Make sure that you don't restrict the usual exhaust passages, because the engine might be damaged by the overheating this would

cause. The tap you install on the muffler should have a diameter similar to that of a regular exhaust outlet. A 1/2- or 3/8-inch threaded brass coupler (available at any hardware store) can be used. I clamped a piece of 3/4-inch, high-temperature hose onto this outlet, and I ran it along the bottom of the fuselage to the middle of the wing. Here, I attached a brass tube with a 90-degree bend; it enters the fuselage between the rear servos. I covered the tube with two pieces of silicone and a rubber adapter, which stay in place. As you can see, when the wing is installed, the wing fitting plugs into the tube.

It's better to install the tubes in the wing as you build it. Make sure that the "T-fittings" and tubes that run inside the wings to their tips are made of high-temperature nylon (available at most plumbing-supply outlets). Remember, the larger the tube's diameter, the more smoke you'll get from it. (The photos clearly show the tubing's layout.)

There you have it. Getting your wings to smoke is fun and easy.

Here's a list of companies that supply smoke-system products:
***B&B Specialties, Inc.,** 14234 Cleveland Rd., Granger, IN 46530.*
***Slimline Manufacturing,** P.O. Box 3295, Scottsdale, AZ 85257 (mufflers).*
***J'Tec,** 164 School St., Daly City, CA 94014 (mufflers, valves).*
***C.B./Tatone Products Corp.,** 21658 Cloud Way, Hayward, CA 94545 (mufflers, valves).*
***Du-Bro Products,** 480 Bonner Rd., Wauconda, IL 60084 (fuel tanks and smoke valves).*
***Perry Aeromotive, Inc.** 1568 Osage St., San Marcos, CA 92069 (pumps).*
***Robart Manufacturing,** 310 N. 5th St., St. Charles, IL 60174 (valves).*
***Sonic-Tronics,** 7865 Mill Rd., Elkins Park, PA 19117 (pumps).* ■

SETTING UP A Smoke System

You only need two elements to set up a smoke system in your model:
- a combustible fluid that's injected into your engine's exhaust
- an exhaust temperature that's high enough to cause a partial combustion of the fluid.

Injecting fluid into the exhaust can be accomplished in several ways.

Illustration 1—Use a separate fuel pump that's powered by its own batteries. Wire a microswitch, which is mechanically activated by a separate servo on an auxiliary channel, to the pump. When you activate the pump, it draws the smoke fluid from a separate fuel tank and injects it into the engine exhaust.

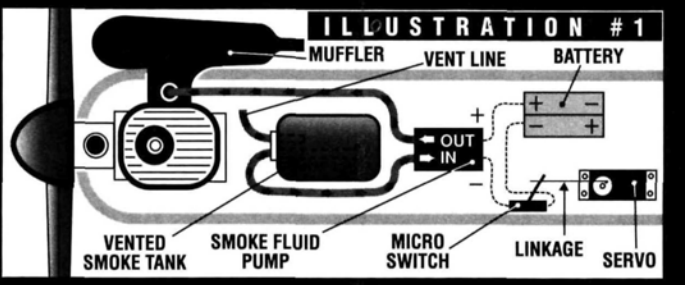
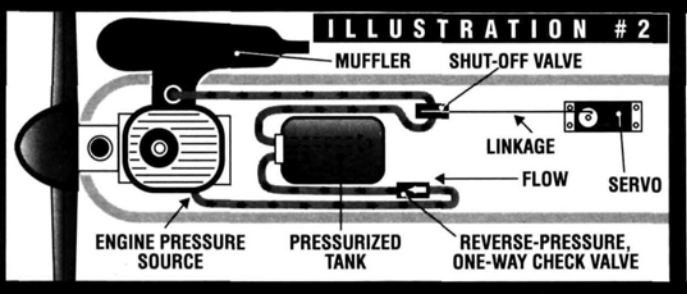


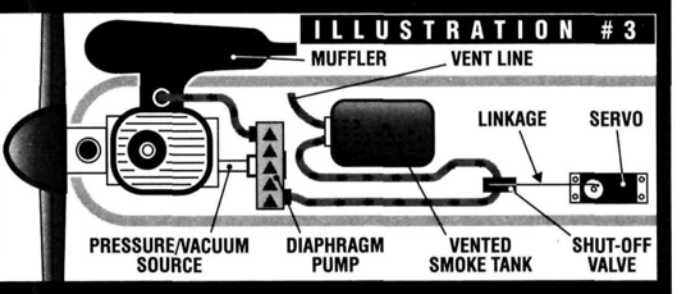
Illustration 2—Use the engine to pressurize the smoke-fluid tank and force the fluid into the exhaust. A servo-controlled shutoff valve starts and stops the fluid's flow and regulates the pressure. A passive check valve keeps the pressure and the fluid from backing up into the engine.

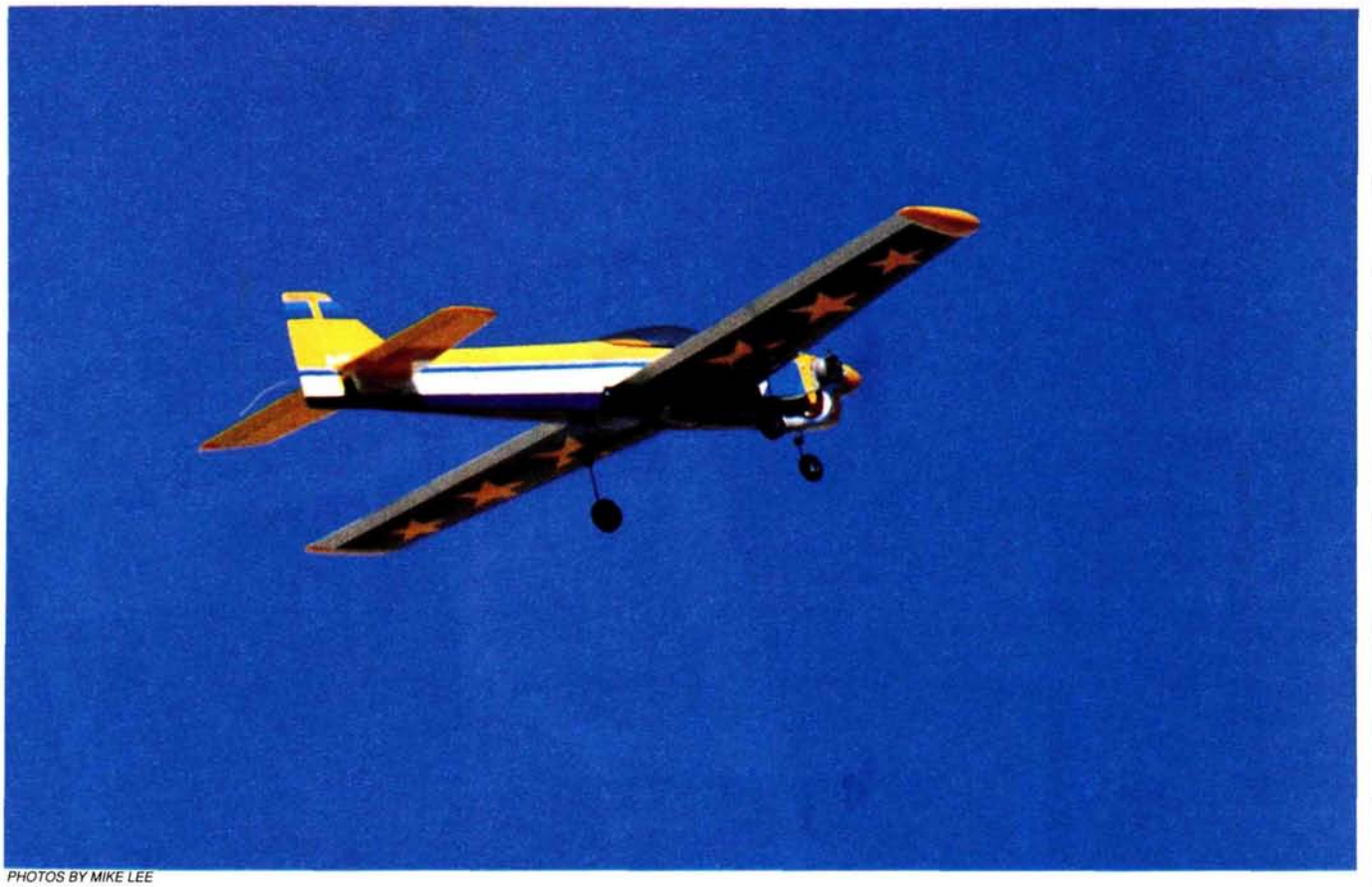
Illustration 3—Use a diaphragm pump that's driven by a pressure/vacuum source that's tapped off the engine crankcase. Because this type of pump uses an integral reverse-flow series of valves, a check valve isn't necessary. All that's needed is a servo-actuated shutoff valve.

Any type of commercial fuel tank can serve as a smoke-fluid tank, but the fuel line must *not* be of a silicone material (use neoprene or heat-resistant rubber). A 50:50 mixture of diesel fuel and kerosene makes a good smoke fluid, or you can buy ready-mixed smoke fluid.

In the November '84 issue of *MAN*, Charlie Kenny had a detailed article on how to set up and operate smoke systems. If you don't have this issue, write to *MAN*.







PHOTOS BY MIKE LEE

HOBBY SHACK ★★★

EZ Calm 25

A new EZ ARF shoots for pattern-ship performance

by MIKE LEE

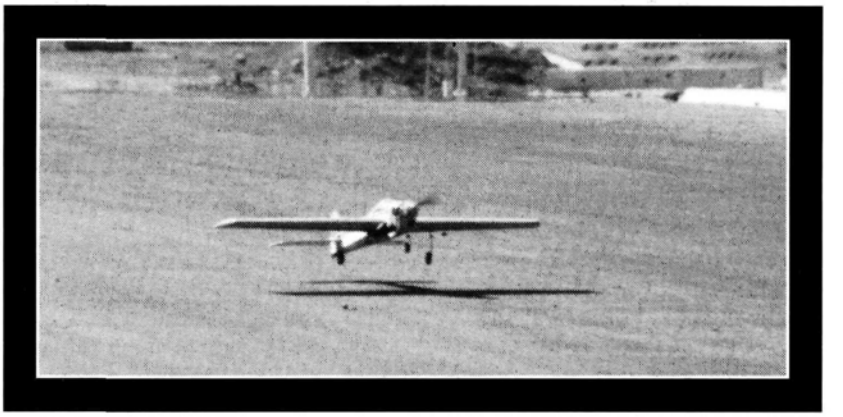
NOTHING HAS QUITE the feel of a rock-steady aircraft that follows your every command! Pattern planes are well-known for being precise, solid fliers that go where you aim them, stay where you leave them and must be flown competently.

Usually, big birds respond better to commands and fly more smoothly than small birds, and this is one reason why .60-size pattern aircraft are the most common. Getting the same handling from a smaller craft has been tough, but now EZ Sport Aviation* has attempted to capture solid performance in a plane that's designed to accommodate .25- to .32-size engines.

The Calm 25 is the EZ ready-to-fly (RTF) version of the larger Calm 60, which has been very successful in pattern competition in the Far East. Like other EZ aircraft, the Calm 25 can be assembled quickly and easily. It's a pure pattern bird with compact proportions!

The author with the Calm 25 and Airtronics radio.

☆☆☆

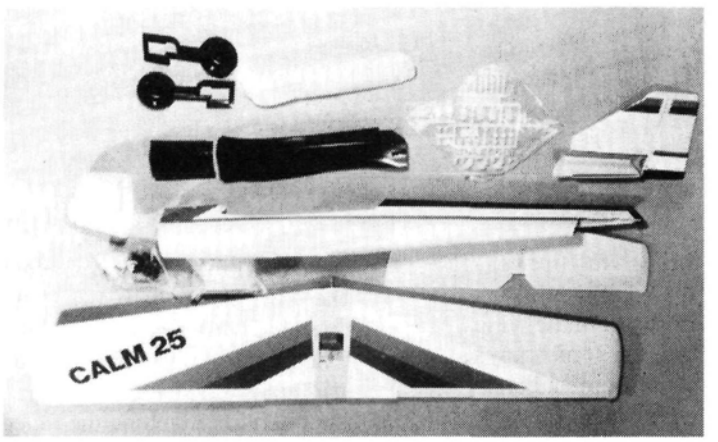


Even at this ridiculous angle of attack, the Calm 25 displays no tip-stalling on the landing flare. The tail hit the deck first.

EZ Calm 25

ASSEMBLY

Like the rest of the EZ line, the Calm 25 has a balsa-and-ply frame that's covered with a laminated plastic skin. The skin is colored (not painted), and it will resist almost everything to which modelers will subject it—except sharp objects! Assembly is straightforward (you simply put together the sub-assemblies); the die-cutting is well-done; and the parts fit very well. The only major problem with my review kit was its instructions: they were in Japanese! Fortunately, more recent kits include a translation.



The kit parts. As with most EZ kits, there isn't much left to assemble!

THE WING

Start by assembling the wings. This is easy, because there are only a few parts that go in the middle of the halves. Attach a set of false ribs to each wing's center inside ribs; these fit perfectly and help you to position the wing's mounting dowel.

Now join the plywood main spar and balsa support to make the sturdy center spar. If any trimming of the wing halves is necessary, do it now, and then epoxy the spar into place—on one wing half at a time. (Don't worry about making a mistake here; the parts only fit together in one way, so you can't go wrong.) When you join the second wing half to the first, make sure they're aligned, because this is critical. (The wings on my plane were a perfect fit.) Finally, attach the center trim covers with a fast-drying adhesive. (I used Hot Stuff* Super T.)

The kit includes self-adhesive trim sheets for the top of the wings. The colors don't exactly match those on the wing skins, but it doesn't look good to have the sunburst design stop short of the ailerons.

Now mount the wing on the fuselage using the supplied hardware. This is easy, and the pictures in the instructions are very good. Put the plywood servo trays into the center of the wing. These are made to hold standard-size servos, although miniservos should be used. (Micros would be too small.)

Fit the aileron servo to one side of the wing opening, working from underneath, and mount the retract servo alongside it in the same opening from above. Then hook-up the aileron links.

ENGINE INSTALLATION

Included in the kit's full hardware package are an engine mount and a fuel tank. They fit very nicely up front, and the pictures are a big help with assembly. The engine—an O.S.* Max .32 FSR—fits perfectly in the nose, but don't drill holes for it yet; just fit the mount and tank.

SPECIFICATIONS

Type: *Pattern ship*
Wingspan: *41.2 inches*
Wing Area: *462 square inches*
Wing Loading: *20 ounces/square foot*
Length: *40 inches*
Weight: *3.5 to 4.5 pounds*
Power Req'd: *.25 to .32 2-stroke w/pipe*
No. of Channels Req'd: *4 or 5 (ailerons, elevator, rudder, throttle, optional retracts)*
Sug. Retail: *$240*
Features: *The kit includes a plastic canopy; an ABS cowl; a prefabricated, Mylar-covered, foam-board fuselage; fixed landing gear; hinges, horns, spinner, engine mount and all other necessary hardware.*
Comments: *An excellent pattern aircraft for its size, the Calm 25 is fast and responsive with the engine and pipe used. I recommend it for experienced pilots who want pattern performance in a compact bird.*

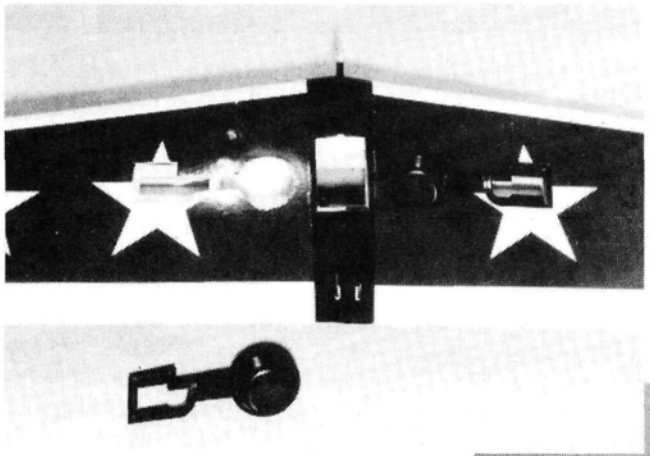
EZ Calm 25

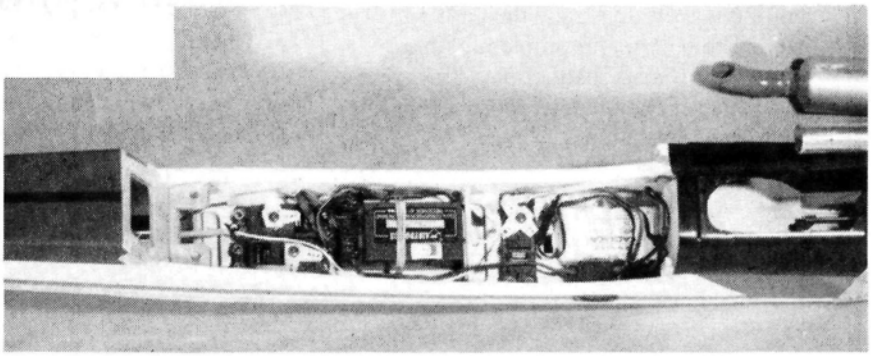
☆☆☆

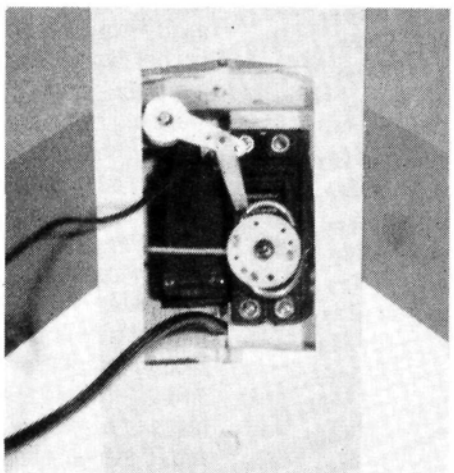
Some plywood pieces stick out past the firewall on the left and right sides of the Calm's nose. These are reinforced with kit-supplied ply parts, to which the cowl is mounted. I "friction-fit" the engine to the mount, and then started to trial-fit the cowl into the nose (the rear of the cowl needed trimming). I wanted to ensure a close fit of the cowl to the engine's spinner ring. Now, mount the engine permanently.

Fit the throttle cable next, because "snaking" it through the forward formers is no fun when the tank floor is in place. I didn't like the throttle-linkage material supplied in the kit (a plastic guide tube and a steel wire), so I substituted a Sullivan* NyRod, which works much better.

Before you install the 180cc fuel tank, be sure to protect the entire firewall from oil by coating it with epoxy. It's a very snug fit through the F-2 former, so you have to push hard to get the tank to poke through the firewall. If it doesn't, the wing won't seat properly forward in the wing saddle. To prevent oil from seeping into the plane, apply silicone sealant to the end of the tank that sticks through the firewall.







Above: The Calm 25's wing with the retract wells cut out and the inserts installed in one half. Right: Interior view. Full-size servos will fit inside the fuselage, and there was plenty of room for the radio. Below: The top of the wing showing the retract-servo setup. Note that the tiller arm, which is used to transfer servo action to the wing's ailerons, connects to the nose gear.

LANDING GEAR

The kit includes fixed landing gear (which are hard-mounted to hardwood blocks and set into the wing and fuselage), but you also have the option of using retracts. I don't think a slick pattern bird looks complete without retracts, so I used ones from OK Models*. They're easy to install and work very smoothly.

First, cut holes in the wing for the retract wells, and glue in the molded inserts that are provided. The retracts are mounted exactly where the fixed gear would go, and the linkage is then run to the center of the wing. To allow clearance for the pushrods, a small section of the center wing rib must be trimmed.

Whether you use fixed landing gear or retracts, there's *no* nose steering. Why?—probably because traditional pattern birds are seldom allowed to taxi to or from the runway during competitions. The nose gear is somewhat tricky to hook-up to the retract servo. You have to file a flat spot on the retract linkage; otherwise, the tiller arm will slip when the servo pulls on the linkage.

You've almost finished! Glue the nose cowl into place, and attach the ABS-plastic belly pan to the fuselage with four wood screws. The fit is tight, so only very minor trimming is needed. Hardware is supplied for attaching the tuned-pipe strap holder to the wing, but this only works if you have a strap like that found on Hatori-type pipes. I didn't, so I made my own tuned-pipe holder from a cable-tie anchor (available at electrical stores). To provide a hard mounting surface, I installed a piece of scrap plywood on the inside of the wing skin.

TAIL ASSEMBLY

The tail parts are flat, covered and ready to attach. Run the pushrods through the fuselage first, and then mount the horizontal stab. Make sure that it's correctly aligned, or

the vertical stab will be crooked. After you've mounted the tail planes, install the radio gear, give the pushrods a final adjustment and attach the trim covers.

EQUIPMENT

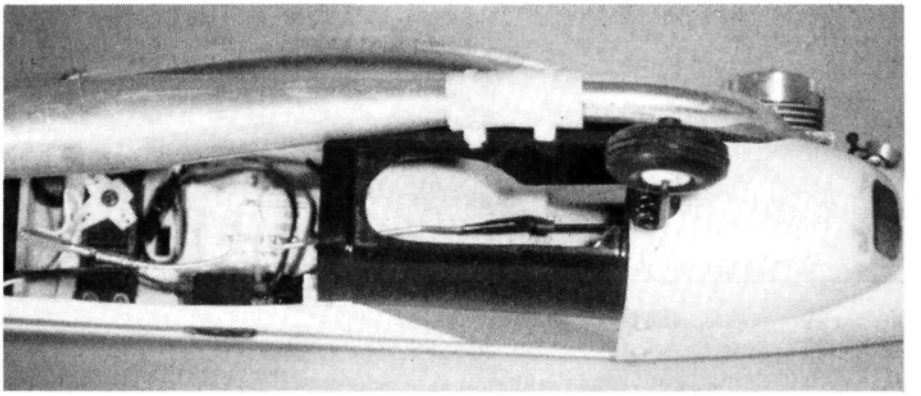
I use an Airtronics* Module Series 7-channel radio in my Calm 25, because I've always found it dependable. It has dual-rate elevator and ailerons, three-way mixing, end-point adjustments on the primary channels and exponential rates—more than enough features for this pattern bird! I also used Airtronics servos: 94551 contest servos on elevator, rudder and throttle; an older 94462 miniservo on the aileron; and a 94734 on the retract. Miniservos would be adequate, but I wanted to see how much radio equipment this plane would hold! I also use a 250mAh battery.

Known as a powerhouse in its class, the O.S. Max .32 FSR engine has proven to be very dependable and strong—just how strong, I'd soon find out! I used a pipe from RJL Enterprises* and a Mac's* long header. (You really need a medium header for a correct fit, but I had a long one hanging around my shop, so I used it.) It was 10.5 inches from the glow plug to the high point of the pipe. I used an APC* 9x8 propeller, too; this might seem like a lot of pitch, but stay tuned!

The kit calls for the finished plane's all-up weight to fall between 3.75 and 4.25 pounds; mine was right in the middle at 4 pounds. I placed the balance point 5.5 inches from the wing's leading edge, or about 40 percent of the chord rearward. For surface throws, I gave the bird 1/2 inch up and down movement from center on the elevator, 3/4 inch from center on the rudder and 3/8 inch on the ailerons.

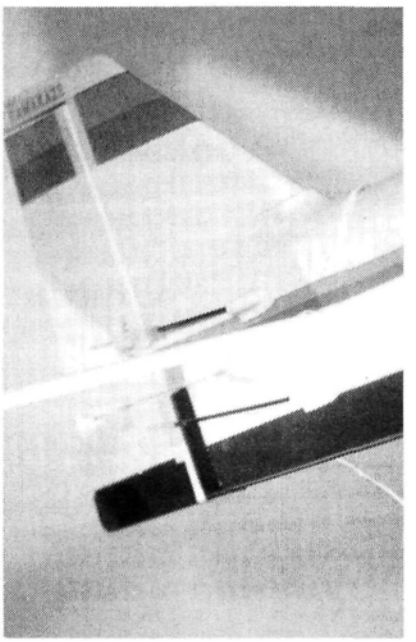
FLYING

I felt somewhat apprehensive when I first flew the Calm 25. Normally, the bird should sit level on the ground, but it had a slight nose-down attitude because of the way the landing gear is set up. Also, I wasn't too sure of the balance point, as it felt heavy on the nose gear (but that's why you run a test hop!).



The nose-gear bay and retract, for which there's plenty of room. If you didn't know better, you might mistake this for a .60-size bird.

A true pattern plane, when airborne, the Calm stays where you put it and has plenty of power to spare.



A view of the tail feathers shows the pushrod exits and hoods, which are supplied in the kit.

On PowerMaster* 5-percent-nitro fuel, the Max .32 fired-up immediately, and I tweaked on the idle mix until the engine purred contentedly. At full throttle, the piped engine turned the 9x8 prop at 12,500rpm. I aimed the Calm 25 into the wind (remember, there's no ground steering) and opened it up; it took off in 50 feet. No sweat!—this little baby moved right out, and I cranked in a little right aileron to get it tracking on line.

After a few photo passes, I opened the throttle—and quickly closed it! This turkey is *fast!*—and the landing gear was still hanging down! After a few more passes at 3/4 throttle, I pulled up the gear and found that a little down-trim was necessary to hold down the nose.

Although it's very steady for its size, the Calm 25 isn't one to live *down* to its name. You must be an experienced flier who knows how to handle a fast bird. A true pattern plane, when airborne, the Calm stays where you put it and has plenty of power to spare. Its mid-wing design gives good rolling response. Up-elevator response is immediate when the plane is upright, and only slightly hesitant when it's inverted. The rudder response can be overpowering if "slugged in," but when input smoothly, the plane will perform good point rolls and knife-edge flight. Stall turns are somewhat labored, but they're nothing a little throttle can't handle.

With the O.S. .32, vertical power is tremendous. The airframe will torque pull to the left as it leaves the ground under full power, but

(Continued on page 118)

QUIET FLIGHT

by JOHN LUPPERGER

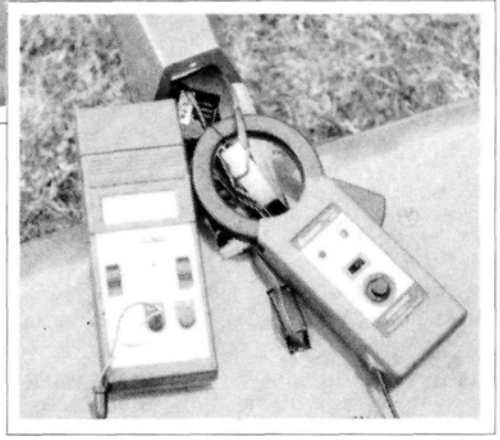
A new "Project" plane, goodies from Europe, and more

I ENJOYED WORKING on the previous "Project" planes (Wanderer and Sophisticated Lady), and judging from the letters I've received, you enjoyed them, too.

With the Wanderer, we strengthened a basic trainer and improved its flight characteristics. We also strengthened the Sophisticated Lady and improved its flight envelope. Next, we'll transform a 2-channel glider into a multi-functional, competitive ship, and one of my own 2-meter designs is just right for this project....

PHOTOS BY JOHN LUPPERGER

Left: The Northrop N9M-A right after takeoff—just seconds before the retracts are activated.



Here are Graupner's new Clamping Amp Device and Digital Multimeter/Tachometer. To obtain a proper reading on the Clamping Amp, you have to put the motor-lead wire inside the loop of the transformer jaws.

PROJECT EXPLORER

The Explorer kit from Global Quality Kits* is the perfect step up from the Sophisticated Lady, and it should be easy to modify. You can buy it at your local hobby dealer (or from Hobby Shack*) for about $35 to $45, which isn't a bad price range for a 2-meter model with a full D-tube wing.

To improve this model's performance, we'll strengthen it and make it more controllable. We'll reshape the fuselage slightly, and strengthen the tail surfaces and give them a "foil" shape. We'll reshear the wings and give them a new dihedral setup as well as spoilers and ailerons. We'll start this project next month, beginning with the fuselage and tail surfaces. If you're ready to move up from rudder/elevator control, but you aren't ready to sink hundreds of dollars into a new glass-and-foam model and a computerized radio, this plane will be just the ticket!

CLAMPING AMP DEVICE

I recently bought a Graupner* Clamping Amp Device and a Digital Multimeter/Tachometer from Hobby Lobby International. I figured that by measuring my motors' amperage draw and playing with a variety of props to check the rpm with a tachometer, I could really tune my models.

Because I had never before seen a Clamping Amp Device, I carefully read its brief instructions. On the first try, my Cobalt 05 on 7 cells measured 8 amps—it just didn't make any sense! I tried the device several times on a variety of motors and obtained similar "low" readings. Fortunately, my flying buddy Dieter Lamprecht was familiar with the device, and he showed me where I was going wrong.

The instructions tell you to, "Press the trigger to open the transformer jaws, clamp one conductor (wire) only, and then read the display values directly from the multimeter." I actually clamped the wire with the transformer jaws (following the instructions!), but the wire is really supposed to be enclosed by the loop that's formed when the jaws are closed (see the photo). Now that I know how to use these units, my measurements are accurate. This is one pair of electronic "toys" that's going to get a lot of use.

NEW GOODIES FROM EUROPE

Hobby Lobby sells more products for electric and glider enthusiasts than any other company. Its Catalogue 17 is now available, and it has a lot of new "goodies" from Europe.

(Continued on page 94)

AIRWAVES

(Continued from page 11)

CARING FOR NI-CDs

I've been looking for information on the care and feeding of Ni-Cd batteries, becauseI have several electric models and want to treat the batteries properly. I built a charger/discharger using an Astro Model 112 constant amp that has the capacity for 1 to 28 cells, a variable pot for discharge load and two digital meters, so I can monitor voltage and amperage simultaneously. This unit can handle anything from a single N-cell to a 30V power supply.

I'd like to interface this equipment with my Mac SE to automate and record or graph data, including storage capacity. What effect does the rate of charge/discharge have on cell life and capacity? Can partially discharged cells be properly charged without the "memory" effect? What about a maintenance voltage used in storage? How low should the voltage be allowed to drop without danger of cell reversal for a single cell or a pack? How can a pack of six or seven cells of slightly different characteristics be efficiently handled? I have many more questions, but are they important, or is this overkill?

I'd like to do some research, but I don't want to reinvent the wheel. I also need to know how to interface equipment with a computer. Do you know of any technical reports that cover this? Are there others delving into Ni-Cds who'd be willing to collaborate, or share information? If so, how can I contact them?

JACK BOYT
Des Moines, IA

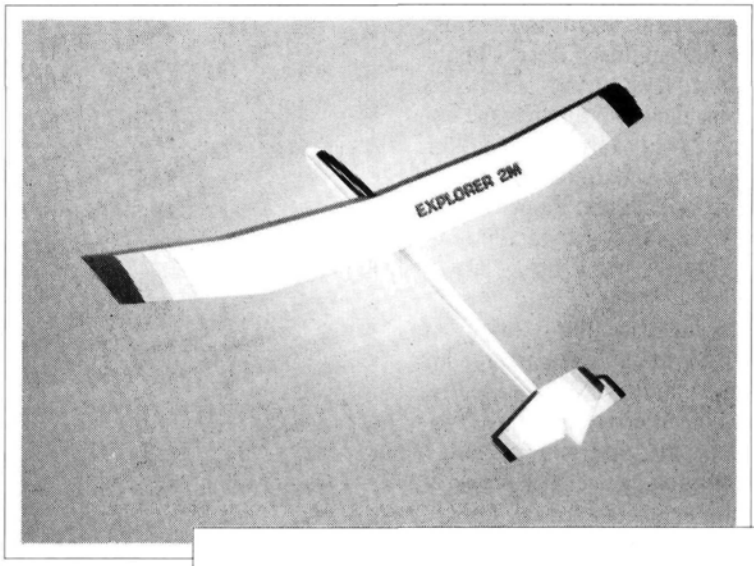
Jack, approaches differ according to whether you wish to optimize performance (as in the R/C car world) or want good performance and maximum battery life. We can provide some preliminary answers here.

Two products that perform battery analysis and can be interfaced with an IBM computer are the Hi-IQ Senior (sold by Victor Engineering, 390 Camino de Estrella, Suite 170, San Clemente, CA 92672) and the Turbomatcher (sold by Competition Electronics, Inc., 3469 Precision Drive, Rockford, IL 61109). Perhaps one of our readers has info on software and/or hardware that will let you interface your setup with the Mac—if so, we'll pass it on!

(Continued on page 95)

QUIET FLIGHT

(Continued from page 92)



Right: The Explorer (from Global Quality kits) will be the next "Project" plane. This model will be modified from a rudder/ elevator sport model to a multi-functional, contest ship.

Although I won't go into much detail, I'll give you a sneak preview of a few items.

For glider guiders, there are four new ships. From Graupner, there's a 91-inch-span DG 300 that uses an Eppler 193 airfoil with a pivoting-trailing-edge speed brake. The kit has a molded-plastic fuselage and balsa-sheeted foam wings. The Graupner Grob G 103A Twin Acro is available in 3.4 and 4-meter versions, and both have heat-tempered, epoxy/glass fuselages and balsa-sheet-over-glass foam wings.

Simprop* also offers two gliders: the scale SB-10 and the aerobatic Sagitta. (I think these were formerly Carrera models). The SB's 4.4-meter span is made of balsa-sheeted foam-cores. Its fuselage is of molded Ferran with the wing mounts already installed. The Sagitta is a very fast, sleek-looking, 87-inch-span model that has balsa sheeted-foam wings and a Ferran plastic fuselage.

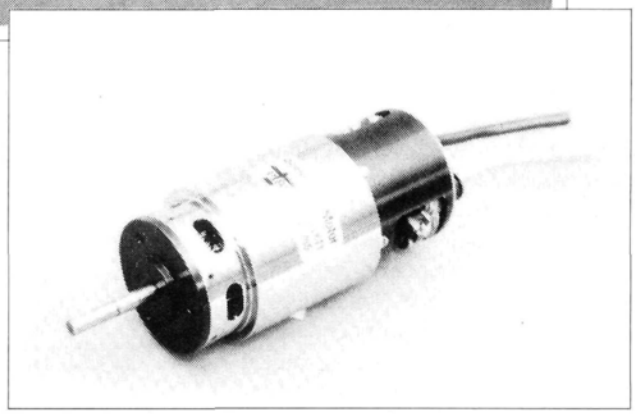
There are three new electric models, too. Graupner's new ASW22BE Vario is an electric sailplane with an adjustable wingspan. It can be changed from 140 inches to 152 inches, or you can add winglets. A model this size would probably use an Ultra 2000, or perhaps an Astro Cobalt 60.

The other electrics are the Elektro-Cat and the Elektro-Akrobat (I don't know which company manufactures them). The Cat has a 69-inch span and should be a good sport model or electric trainer. The Akrobat won the 1988 Electric Aerobatic World Championships. Although the press release didn't specify it, I think this clean, 67-inch-span model has a glass fuselage and foam wings.

There are two new electric motors. For small planes, there's the RS380 Mini Olympus gear-drive motor, which uses a 2.3:1 gear reduction to drive an 8x6 prop. It should produce power equivalent to that produced by an .049 glow engine.

At the other end of the power spectrum, there's the Plettenburg Hectoplett 355 motor, which produces approximately 3000 watts of power. It weighs 24 ounces, runs on 26 to 30 cells and produces about two to three times the power of most .60-size glow engines. It should satisfy anyone's lust for pure, unadulterated power!

For Catalogue 17, contact Hobby Lobby, and don't forget to tell them you read about it in *MAN*.



The Plettenberg Hectoplett 355 motor is one of the most powerful electric motors available. You can see its high-quality workmanship.

ELECTRIC NORTHROP N9M-A

I attended one day of the October 6 and 7 AstroFlight Electric Championships in Sepulveda Basin, CA. Unlike the soaring event for sailplanes and old-timers that's put on by the Harbor Soaring Society each spring, this was a power event for scale, pattern and pylon planes as well as helicopters. Because it was the event's first year, turnout was light, but attendance should be better next time.

I wanted to see the scale models, because I think we'll soon see more electrics in this area. You don't have to worry about fuelproofing electric planes, so they're easier to detail (i.e. you can use model paints without having to apply a clear coat afterward). Further, electric power is suitable for the slower, vintage-type scale models, especially when a drive gear is used.

I saw several interesting models, but I especially liked Bob Ortmann's Northrop N9M-A, which won the event. Regardless of the type of powerplant used in it, it must have been difficult to build, but the fact that it was electric made it even more exciting!

Bob's model has two

(Continued on page 125)

AIRWAVES

(Continued from page 93)

Every Ni-Cd cell has a built-in number of charge/discharge cycles that determine its life expectancy under normal use. As a cell is cycled, its capacity slowly decreases. Larry Sribnick at SR Batteries says that the life of a typical Ni-Cd battery is estimated to be 10 years or 1,000 cycles, but this is only a general rule of thumb.

The crucial variables are whether you (1) fast-charge and, if so, also occasionally slow-charge to balance the pack, or (2) tend to run the pack all the way down. Failure to slow-charge every so often, or the over-depletion of a Ni-Cd will shorten its life. Car racers will caution that slow-charging can slightly reduce voltage level the very next discharge; the cure is a fast, peak-charge.

Because so much depends on how you treat your Ni-Cds, your best bet is to monitor them and decide when they need to be swapped. You might be wondering, "How far down do you run Ni-Cds?" These guidelines will help:

- *if the discharge rate is below 500mA,*

(Continued on page 119)

Advanced Precision Components has a radically new line of model props that were designed especially to give maximum torsional stiffness.

LITTLE-KNOWN FACTS ABOUT Propellers

by JOE WAGNER

EXCEPT FOR the glider-guiders, model fliers depend on propellers to get—and keep—their models airborne. (Ducted fans are really just small, multi-blade props.) Despite this dependence, few of us understand the things—exactly how they work, and why.

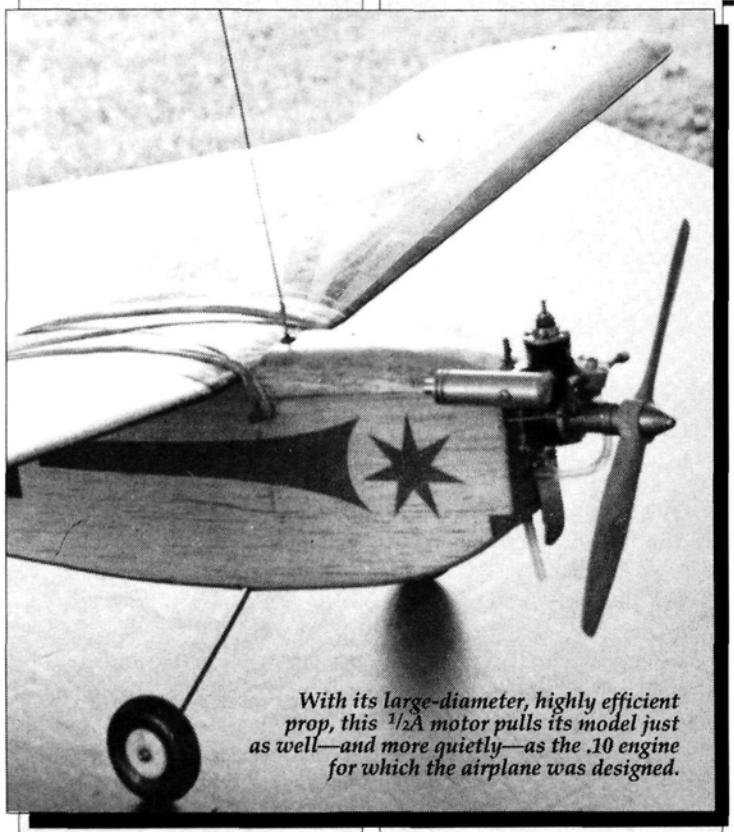
In Britain, propellers are sometimes called "airscrews"—a name that suggests that they "screw" themselves along through the atmosphere in the same way a bolt threads into a nut. (The higher the "pitch," the farther the aircraft travels with each revolution.) That concept is false; a propeller is a rotating airfoil, not a screw. It pulls itself through the air in the same way as a wing produces lift: by deflecting the air molecules it strikes. A prop pushes these molecules behind it, and its forward propulsion is a reaction.

True, the "pitch" of a propeller is specified as if it were intended to screw into a solid substance. The undersides of a "9x6" prop's blades are tilted so that they'd move forward 6 inches if rotated once through, say, a block of clay. (The underside angle is smaller toward the tips than at the hub, because the tips travel farther circumferentially. The slower inner parts of the blades must be more steeply inclined so they'll advance the same distance with each revolution as the fast-moving tips do.)

In fact, a propeller's slanted undersurfaces simply provide the angle of attack its airfoil requires to generate lift; however, there's a great difference between the way a wing airfoil produces its lift and the way a prop develops thrust. In flight, a wing moves forward into an essentially motionless atmosphere, whereas a propeller pulls the air toward itself.

If a wing's angle of attack exceeds about 10 degrees, it "stalls," and the airplane stops flying, but propellers can work with blade undersides angled at 60 degrees and more! Such steeply angled surfaces definitely *are* "stalled" when they start to revolve. A wing airfoil stalls not because its lifting ability itself decreases at high angles, but because its "drag" increases greatly. This excessive drag slows the aircraft, and lift decreases as a consequence. The airplane stops flying and becomes a falling object.

When a "high-pitch" propeller starts to spin, its airfoil is also "stalled," but engine power keeps it rotating de-



With its large-diameter, highly efficient prop, this 1/2A motor pulls its model just as well—and more quietly—as the .10 engine for which the airplane was designed.

PHOTOS BY JOE WAGNER

BASIC INSIGHTS FOR SELECTING optimal props

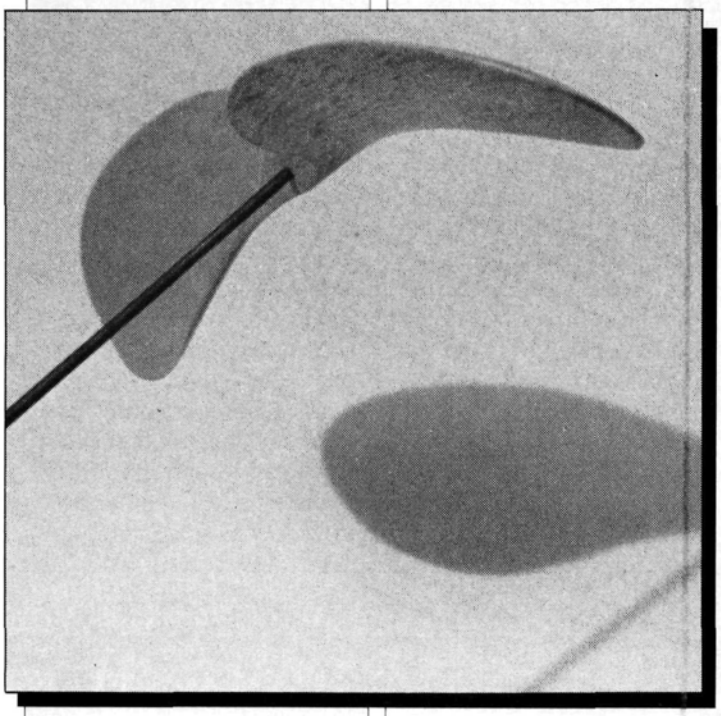
PROPELLERS

spite the excessive drag the blades are developing. The lift that the prop airfoil produces pushes its working air backwards (the slipstream), then more air is sucked in from the front to take its place.

The blade's attack angle is lessened by this incoming airflow, because that air is already moving in the desired direction when the blade strikes it. Thus, drag decreases; thrust increases; and incoming and outgoing slipstream velocities both increase. In a second or so, the propeller establishes its own optimum working environment. The incoming airflow automatically adjusts the angle at which it meets the blades until maximum effectiveness occurs for that particular prop's rpm, diameter, and blade shape and pitch.

VARIABLES AFFECTING THRUST

The most important variables affecting the amount of thrust a propeller develops are its *diameter* and *rpm*. Thrust increases when either of these increases: in proportion to the *square* of the rpm and the *fourth* power of the diameter. Thus, if you speed up a given prop from 10,000 to 14,142 rpm, its thrust output will exactly double; and if you spin a 10-inch prop at the same rpm as a geometrically-similar 5-incher, the thrust developed will be *16 times* as great.



Naturally, an engine's power to turn its propeller is important. A big prop absorbs more horsepower than a small one; one with high pitch needs more power than one with low pitch. Thrust doesn't come free! The engines in most R/C aircraft can now put out *far* more power than models need to fly, and this allows us a very wide range of usable propellers.

PROPS & NOISE

The noise made by R/C airplanes has become very important in the fight to save flying sites. In an attempt to reduce noise, fliers are experimenting with their props. Lowering the velocity of a prop's blade tips (running a smaller prop at the same rpm, or a larger one more slowly) is one useful approach; another is reducing engine speed and, thus, the frequency and intensity of its exhaust noise.

These sound-reduction methods can be combined, by either of two opposing techniques. AMA President Don Lowe advocates *increased* propeller pitch and *decreased* diameter, but I do exactly the opposite on my models, because it's far more efficient.

The working efficiency of any reactive propulsion system (propeller, jet, or rocket) is found by comparing the velocity of the vehicle with the velocity of its "backflow." If these were the same (an impossible condition), the propulsion would be 100-percent efficient, and there would be no slipstream behind the aircraft. The air a plane moved through would be as still as the railroad track behind a speeding locomotive.

The closer we approach this ideal with a propeller-

(Continued on page 126)

HELICOPTER SECTION

C O N T E N T S

In this issue, David Ramsey covers the 3rd Annual Schluter Cup (over 64 contestants participated in FAI, intermediate, novice and scale competition). Mike Billinton takes a close look at the Super Tigre G .34 heli engine.

Photo above: Japanese Nats champ Sensui Kazuyuki flies the Kalt Omega while another member of Team JR watches from behind. (See TOC coverage, page 42.)

NEW HELI PRODUCTS

ROTARY-WING ROUNDUP

KYOSHO
GFM-H Helicopter Radio

New from Kyosho is the GFM-H Helicopter Radio. Its features include five KS-100 servos, a 1000mAh receiver battery pack, a single switch that activates the elevator and aileron dual rate, a throttle hold, an idle-up, a throttle end-point adjustment, pitch end points and reversing on all channels. A perfect system for the beginner, this radio will take you from hovering through loops, rolls and many other aerobatics. It has more features than other beginner systems. **Part no. KYO J50** ** *Price: $399.95*

For more information, contact Kyosho/Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.

MINIATURE AIRCRAFT USA
High-Grade Heli

Here's a high-grade heli fuel that's available with 12.5-percent nitro (Magna, no. 4325) and 30-percent nitro (Magna, no 4327.)

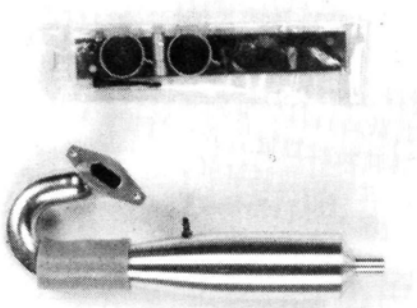
For more information, contact Miniature Aircraft USA, 2324 N. Orange Blossom Trail, Orlando, FL 32804.

ASTRO FLIGHT
Astro FAI 05 Whisper Heli Motor

Larry Jolly demonstrated Astro's new Cobalt FAI 05 helicopter motor at the TOC. His piloting skills, combined with the power of the new Astro motor, made quite an impression on the hobby dealers there. (Astro delivered the first batch of motors to them a week later.) The new motor uses 3mm mounting screws, and it's specially designed to fit the Kalt Whisper electric helicopter without any modifications. This new motor gives the Whisper true aerobatic potential.

Part no. 6605H *Price: $99.95*

For more information, contact Astro Flight, Inc., 13311 Beach Ave., Marina Del Rey, CA 90292.



MINIATURE AIRCRAFT USA
Tuned Pipe

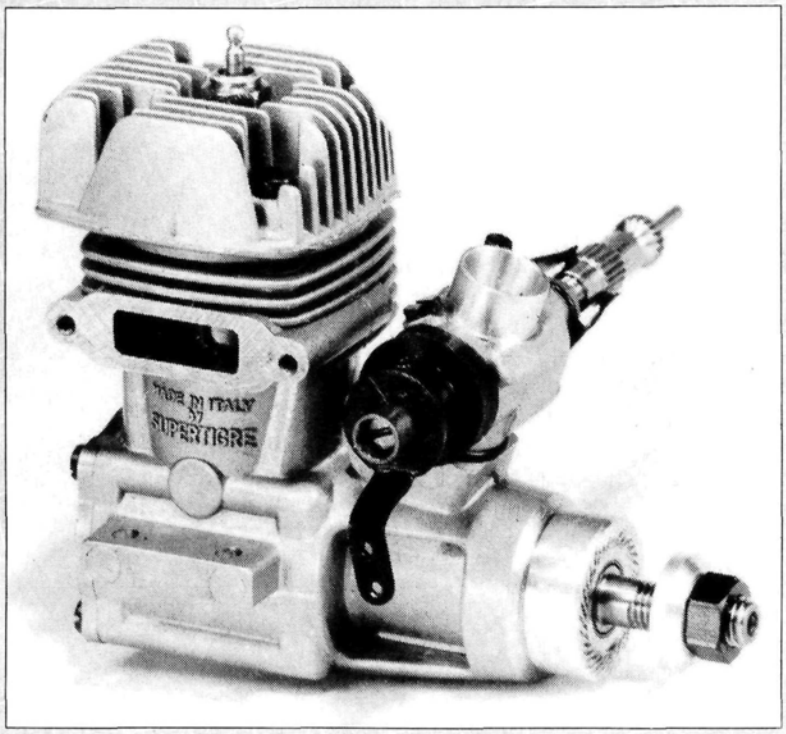
Miniature Aircraft USA offers top-of-line tuned-pipe systems for .30-size machines. Hop-up your heli with a custom-designed pipe. Shown is model no. 3998 for the Concept .30. **Part nos. 3996** (X-Cell .30), **3997** (Shuttle), **3998** (Concept .30) *Price: $54.95 each.* **Part no. 4014** (X-Cell .40) *Price: $69.95.*

For more information, contact Miniature Aircraft USA, 2324 N. Orange Blossom Trail, Orlando, FL 32804.

ENGINE EVALUATION

SUPER TIGRE G .34 HELI

by MIKE BILLINTON



Super Tigre's recent change from its traditional, thin-wire needle fuel control to this thicker ratchet style has led to an improvement in fuel-control linearity.

HAVING ASSESSED the merits of nickel-plating cylinder bores, Super Tigre has returned to the ABC style of chroming the aluminum piston/brass liner on the inside. The ABC method is expensive, but it avoids some of the tolerance problems that have plagued manufacturers of the cheaper nickel-plated (ABN) style.

The 5½cc G .34 is Super Tigre's most dynamic small helicopter engine. It's very rigid; it has a good piston seal (even though it's in ringed form); and, thanks to the company's continual experimentation with cylinder and crankshaft timings, its performance almost equals those of many .40 engines.

MECHANICAL DETAILS

For maximum rigidity, the sleek, "G" series crankcase is made in one piece, and it uses the S. Tigre transfer-passage setup in which the boost side is much larger than is the case with usual Schnuerle boost passages. This transfer design is arguably a "halfway-house" between the old-fashioned cross-flow scavenge method and a full Schnuerle style.

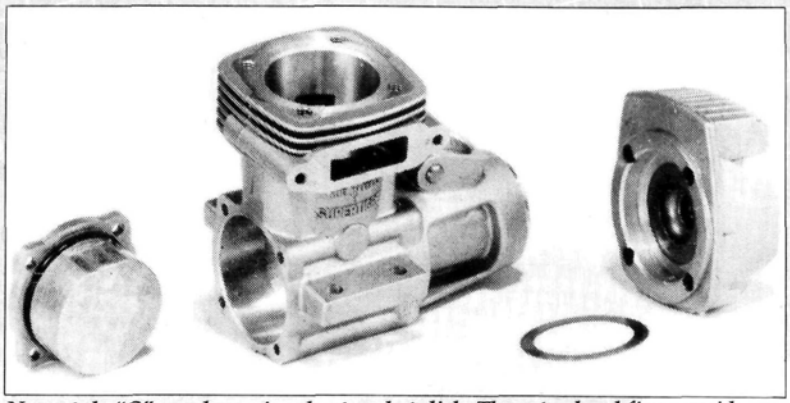
The core of the engine is a stocky, rigid, hardened-steel crankshaft with an enlarged main journal and crankpin. (It looks as though it could outlast the rest of the engine.)

The brass cylinder features S. Tigre's favored, thick, distortion-free upper flange. The brass bore is accurately ground and then chromed. After that, it's subjected to a minimal honing to remove chrome "high spots," and the bore's final taper is approximately 0.002 inch.

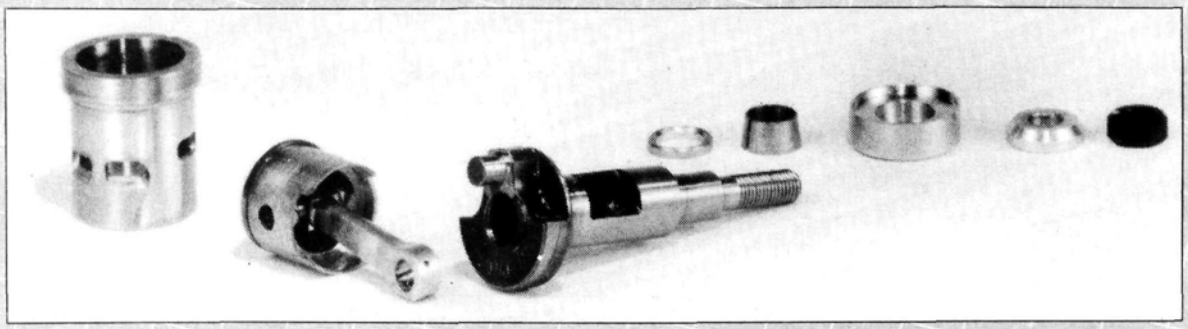
The high-silicon-content piston is fitted at an average tolerance of .0015 inch, which is significantly close, given that a standard, pegged piston ring is used. For helicopters, the close-fitting piston with ring is good, because it's durable and has good heat control and a reliable seal.

The machined, aluminum-alloy connecting rod has the usual S. Tigre layout and has phosphor-bronze bushings only at the big end. The "G" series, one-piece cylinder-head with overhanging fins has an adequate heat-sink capacity, so Super Tigre has no need to resort to supplementary heat sinks. It's also .65 ounce lighter than the S.29 heli engine.

The 7.26mm-bore carburetor has the usual secondary needle control for idling and mid-range mixture strength.



New-style "G" crankcase is robust and stylish. The extra head fins provide an adequate heat-sink capacity for helicopter use.



The upper cylinder's thick flange is noteworthy. Note the very short, compact crankshaft, which helps to ensure durability.

The main fuel control is by means of S. Tigre's recently improved thicker needle with ratchet security, and a standard, steel, rotating throttle barrel is used.

PERFORMANCE

Engines with piston rings need a longer running-in than is necessary with a plain piston ABC setup. After this, rpm with standard propellers immediately showed the engine's potential, with between 1,000 and 3,000rpm more than the earlier S.29's.

Test 1: Open exhaust. Fuel: 5 percent nitro/10 percent ML70 synthetic oil/10 percent castor oil/75 percent methanol. Plug: S. Tigre long reach.

I noted encouragingly high torque figures throughout the wide available rpm range. The maximum torque of 68 ounce/inches (almost .5 Newton) is among the highest open-exhaust figures I've recorded while testing model 2-strokes. The production of .92hp near to 21,000rpm shows the engine's capacity to rotate freely.

Test 2: Standard "swing" muffler. Fuel and plug as in Test 1.

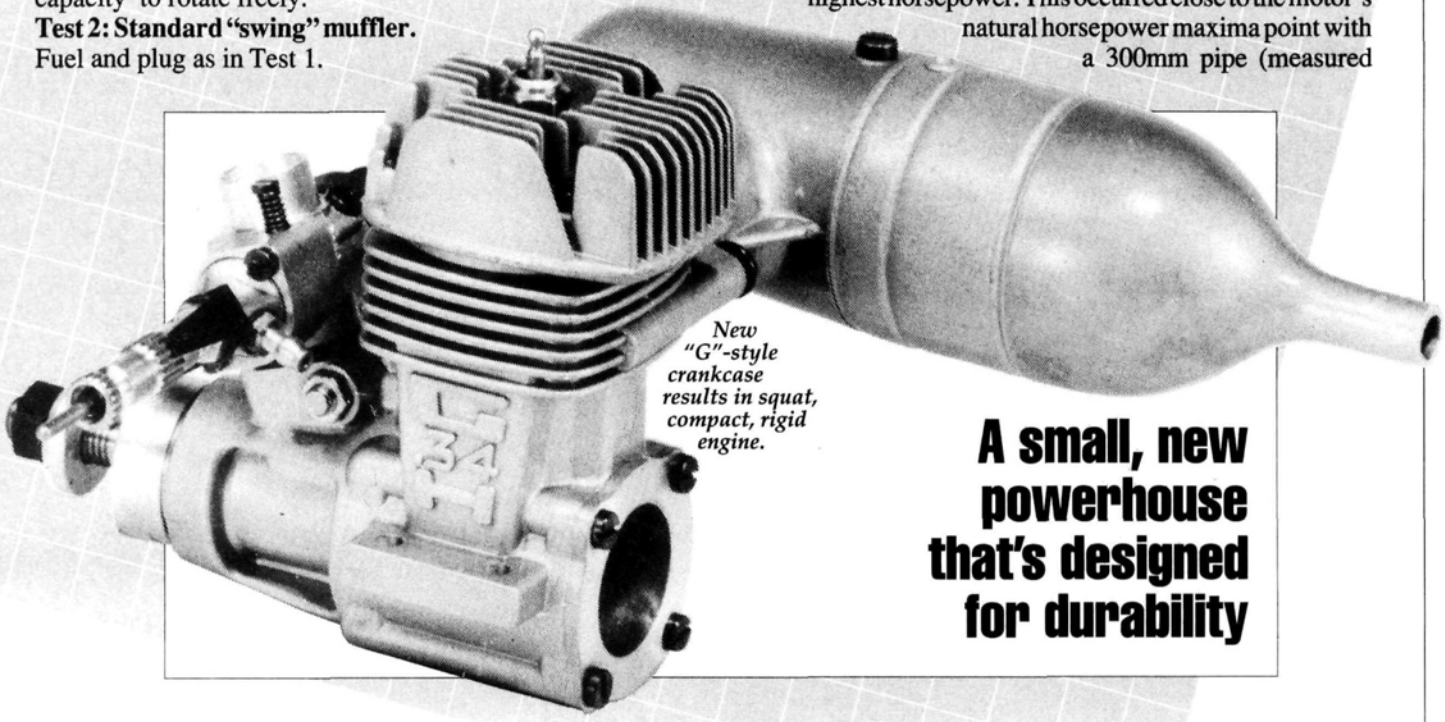
With a 5.6mm outlet, this standard S. Tigre muffler gave the usual reductions in torque and horsepower that are in keeping with the increase in fuel economy. Sound was reasonably suppressed—even at 9,600rpm. (This feature is common to all the engines I've tested so far.)

Test 3: S. Tigre's PAW muffler (at 11 inches, tuned length). Fuel and plug as in Test 1.

In this full-length configuration, maximum tuned resonance occurred at a fairly low rpm point of 12,000. This might be low for many head ratios; a shorter pipe (in accordance with S. Tigre's instructions) should be used. The highest torque was achieved at this length, however, and it's certainly one way of operating the G.34 when sound levels must be reduced.

Test 4: OPS tuned pipe (at 300mm). Fuel and plug as in Test 1.

Use of the adequately sized OPS 29/40 quiet tuned pipe ensured minimal back-pressure loss and produced the test's highest horsepower. This occurred close to the motor's natural horsepower maxima point with a 300mm pipe (measured

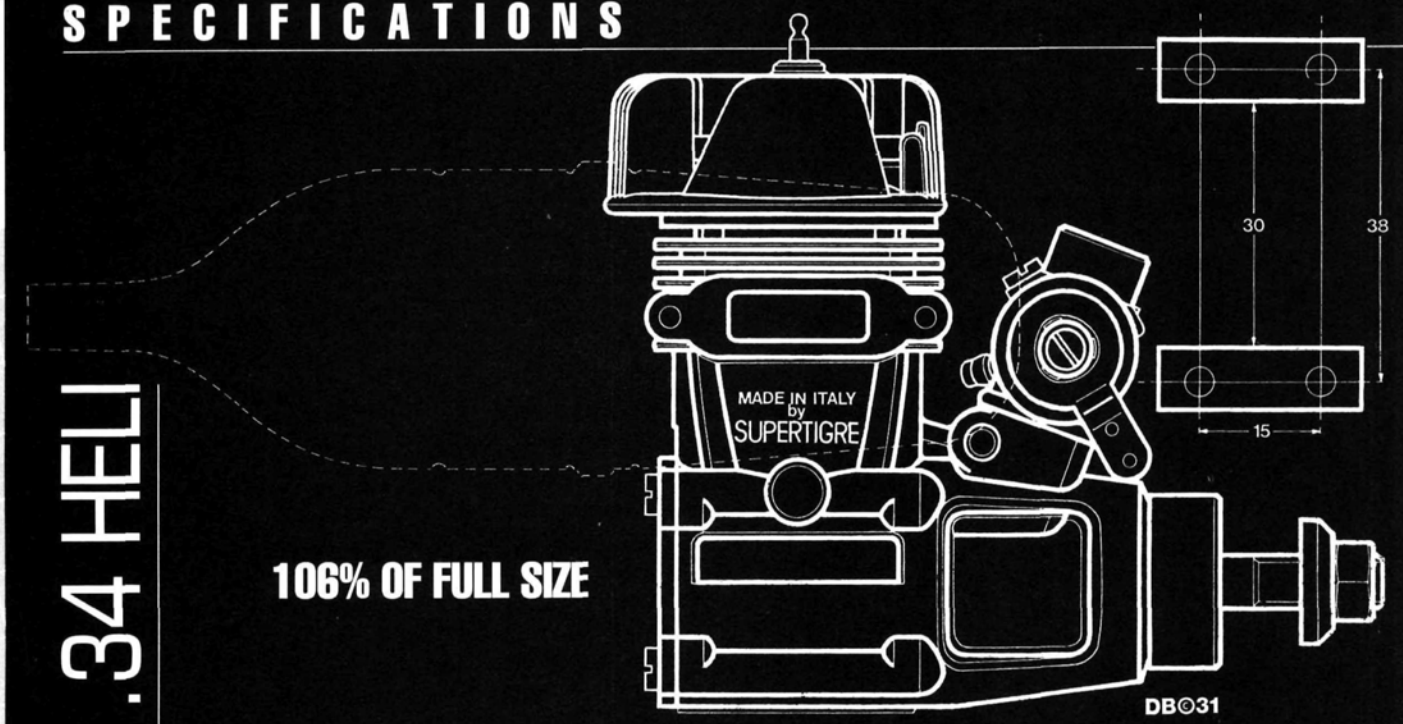


New "G"-style crankcase results in squat, compact, rigid engine.

A small, new powerhouse that's designed for durability

SPECIFICATIONS

SUPER TIGRE G .34 HELI



106% OF FULL SIZE

Capacity	0.337 cubic inch (5.52cc)
Bore	0.788 inch (20.04mm)
Stroke	0.691 inch (17.55mm)
Stroke/bore ratio	0.877:1
Timing periods	Exhaust - 164° Transfer - 130° Boost - 122° Front Induction: —Opens - 38° ABDC —Closes - 54° ATDC Total Period - 196° Blow-down - 17°
Combustion volume	0.65cc
Compression ratios	Geometric - 9.49:1 Effective - 6.96:1
Exhaust-port height	0.206 inch (5.24mm)
Cylinder-head squish	0.028 inch (0.7mm)
Squish-band width	0.151 inch (3.84mm)
Squish-band angle	2°
Carburetor bore	0.285 inch (7.26mm)
Crankshaft diameter	0.511 inch (13mm)
Crankshaft bore	0.337 inch (8.57mm)
Crankpin diameter	0.216 inch (5.5mm)
Crankshaft nose thread	0.251 inch x 28 TPI (1/4 UNF)
Wristpin diameter	0.177 inch (4.5mm)
Connecting-rod centers	30mm
Engine height	2.99 inches (76mm)
Width	1.77 inches (45mm)
Length	3.06 inches (77.7mm)
Width between bearers	1.18 inches (30mm)
Mounting-hole dimensions	15x38mm with 3.5mm holes
Exhaust-manifold bolt spacing	1.26 inches (32mm)
Frontal area	4.55 square inches
Weight (bare)	9.7 ounces (275 grams)

from plug to first maximum diameter).

This aluminum pipe is light and flexible enough to make it a reasonable choice for R/C helicopters. In any case, as with a car's gearbox, using adjustable tuned-length devices of any sort allows the engine's maximum output to be matched more easily to the craft's requirements.

THROTTLE LINEARITY CHECK

Using the same tuned pipe (and other equipment) and the same maximum-resonance rpm level (just over 17,000), with four throttle positions (with load reduced to keep rpm constant), the wide-open throttle needle-valve settings remained nominally correct each time I closed the throttle. The tuned pipe also stayed correctly on resonance during the runs.

IDLING

Using a 10x6 Master prop and a standard muffler and pressure fuel feed, rpm as low as

Performance:

Max. BHP	1.12 @ 17,468rpm	(tuned pipe/5% nitro)
	0.98 @ 17.913rpm	(open exhaust/5% nitro)
	0.88 @ 11,998rpm	(PAW muffler/5% nitro)
Max. torque	72 oz/ins @ 11,998rpm	(PAW muffler)
	68 oz/ins @ 11,263rpm	(Open exhaust)
	67 oz/ins @ 16,328rpm	(Tuned pipe)

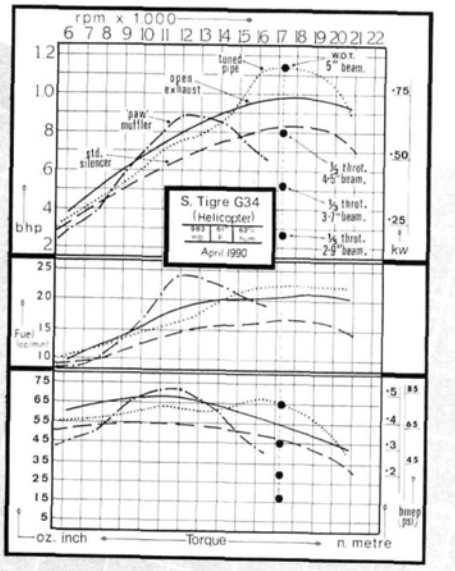
RPM on Standard propellers:

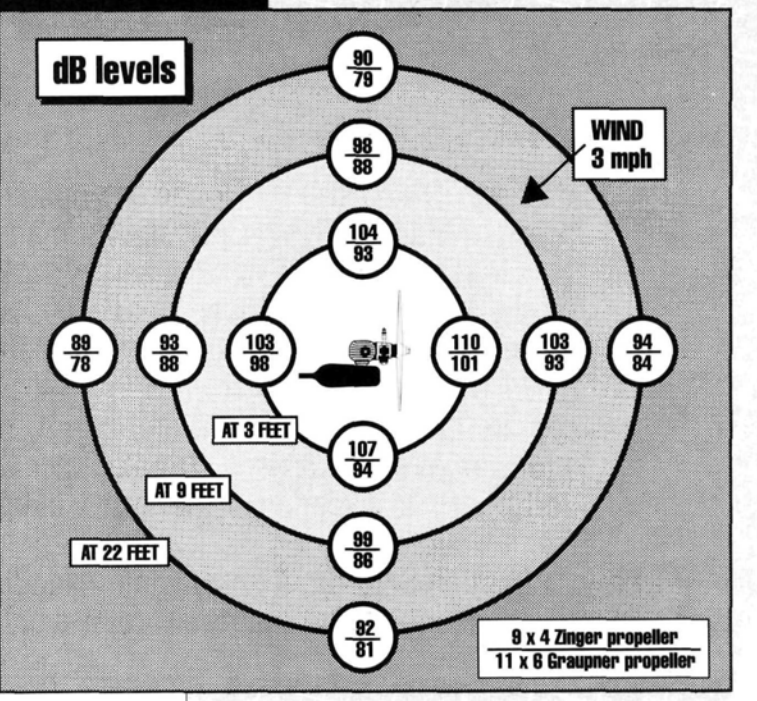
	Open ex.	Std. muffler	PAW muffler	Tuned pipe
12x6 Graupner	9,310	8,623	9,350	8,980
11x6 Graupner	10,720	9,909	11,700	10,600
10x6 Master	13,253	12,425	13,490	12,980
10x4 Zinger	14,530	13,610	14,305	15,600
9x4 Zinger	17,378	16,635	16,320	18,084
8x4 Zinger	19,600	18,817	17,473	19,502
7x4 Taipan	—	21,292	22,314	22,467

Performance Equivalents:

BHP/cubic inch	3.32
BHP/cc	0.203
Ounce inch/cubic inch	213.6
Ounce inch/cc	13.0
Ounce inch/pound	118.87
Gram meter/cc	9.3
BHP/pound	1.85
BHP/kilo	4.07
BHP/square inch frontal area	0.246

Manufacturer: Super Tigre SRL, Bologna, Italy.
U.S. Distributor: Great Planes Model Distributors, 1608 Interstate Dr., Champaign, IL 61820.





SOUND LEVELS—dB

Engine:	Super Tigre G34
Equipment:	Standard muffler
Fuel:	5 percent nitro/ 20 percent oil
Engine position:	3 feet above the ground
Temperature:	61° F.
Humidity:	64 percent
Propellers:	9x4 Zinger and 11x6 Graupner
Mean rpm:	16,400 and 9,600
Sound meter:	Radio Shack's 33-2050 unit set 38 inches above the ground and pointing toward the nearest sound (propeller, muffler, or open exhaust outlet), and at distances of 3 feet, 9 feet and approximately 21 feet.
Meter settings:	"A" scale and "slow" response

2,200 were easily achieved, with good pick-up through mid-range.

SUMMARY

The worldwide popularity of R/C helicopters is clearly leading to the development of suitable engines, and Super Tigre's latest, small powerhouse—the G.34—will probably be a talking point among heli fliers. Its high power and reliability will keep it in the forefront of small-capacity engines for a while. ■

ROBBE SCHLUTER CUP 90

The Robbe/Schluter Whopper on demo flight.

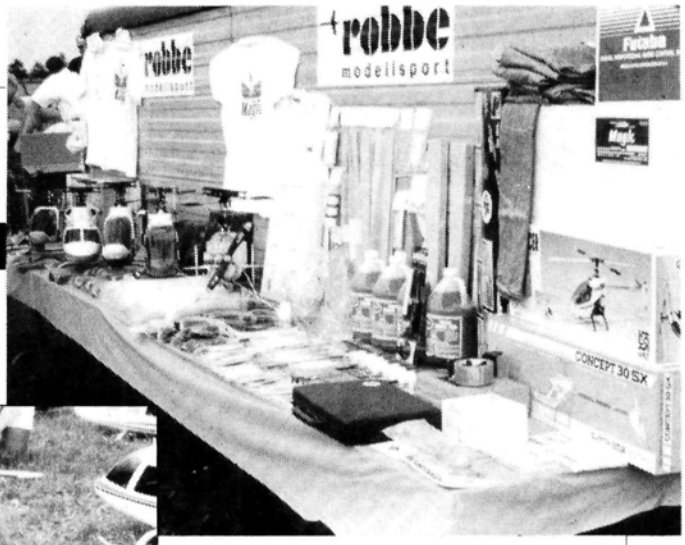
SPONSORED BY Robbe and hosted by the West Windsor Flying Club, the third annual Schluter Cup was held at New Jersey's Mercer County Park on September 14 and 15, 1990. With 64 contestants registered for FAI, Intermediate, Novice and Scale, the pit area was strewn with large and small helicopters of every type—pod-and-boom, scale, electric and even a few autogyros. The Schluter Cup is a wonderful way to experience the ever-widening scope of R/C helicopters.

Although Saturday's gusty wind made things difficult for those in FAI and Intermediate, it didn't appreciably

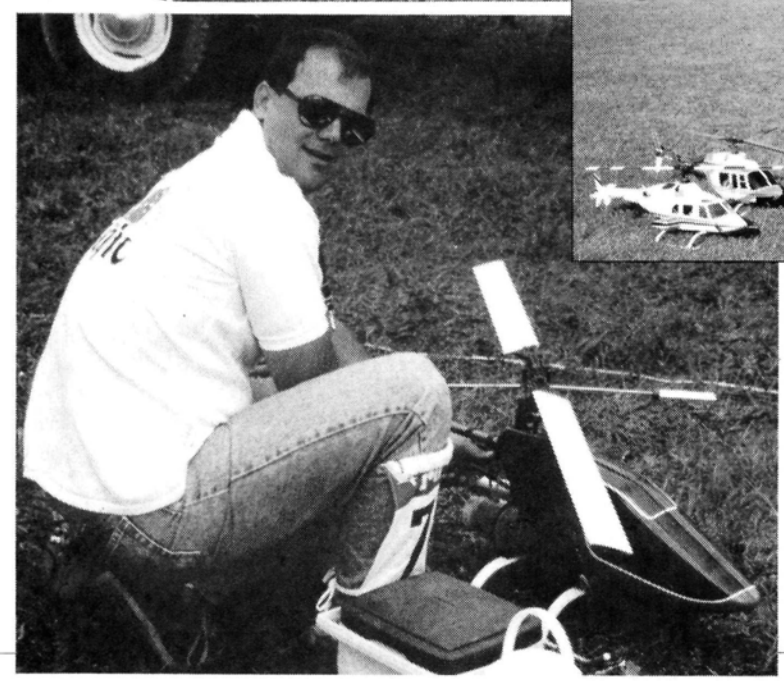
TOP EAST COAST HELI CONTEST DRAWS PILOTS FROM 13 STATES

Tim Lampe demonstrates Concept EP. ▶

by DAVID RAMSEY



PHOTOS BY DAVID RAMSEY



affect the top contenders' scores in Novice. Richard Bell scored 1,000 in all four rounds and won 1st place. Sunday was a better day: more pilots were registered, the crowd was bigger, and the wind had abated. Flights in FAI improved, and they were a lot of fun to watch.

This year's Scale turnout wasn't much better than last year's: five helicopters were judged, and only four flew. Tony Garguilo entered his very impressive Wick BK 117, and with top static points and a heart-

From top to bottom: The prizes were made possible by generous manufacturers. • Schluter Scout/ Hybrid Hang-On fuse flown by Ray St. Onge. • Don Wade's Schluter Magic. • MAS X-Cell/Long Ranger flown by Wayne Mann. • Scale entries. • Mark Powelson and his Schluter Magic.

ROBBE SCHLUTER CUP 90

Above: Dan Carley's Schluter Jet Ranger. Below: A pair of Hirobo Condors flown by Mike Mas. Above left: GMP Legend flown by Peter Cooke. Below left: Wendel Adkins' Schluter Scout in foreground.

1990 SCHLUTER CUP WINNERS

FAI

FIN.	NAME	PTS.	HELICOPTER	RADIO	ENGINE
1	Wayne Mann	476.5	X-Cell Long Ranger	Futaba	O.S .61 SFN Mod
2	Mike Mas	464.5	Hirobo Condor	JR PCM	Enya
3	Wendell Adkins	461.0	Schluter Scout 60	Futaba	Rossi
4	Peter Cooke	448.0	GMP Legend Elite	Futaba	O.S. 61 SFN ABC

INTERMEDIATE

FIN.	NAME	PTS.	HELICOPTER	RADIO	ENGINE
1	Stan Olzaski	334.5	X-Cell 60	Futaba	O.S.
2	Santos Font	329.0	Schluter Magic	Futaba	O.S. 61 SFN ABC
3	Chuck Wildey	281.0	Schluter Magic	Futaba	Rossi
4	Herb Goldberg	280.5	X-Cell 60	Futaba	Enya

NOVICE

FIN.	NAME	PTS.	HELICOPTER	RADIO	ENGINE
1	Richard Bell	3000	Schluter Junior 50	JR Century	O.S. 50
2	Kevin Norton	2909	Schluter Junior 50	Futaba PCM	O.S. 50
3	Raymond Powell	2787	X-Cell 60	Futaba	O.S. 61 SFN
4	Russ Coxe	2787	GMP Legend Elite	JR	O.S. 61 SFN

SCALE

FIN.	NAME	PTS.	HELICOPTER	RADIO	ENGINE
1	Tony Garguilo	2267	WIK BK-117	JR PCM	Rossi
2	Daniel Carley	2211	Schluter Jet Ranger	JR	O.S. 61
3	Dale Hart	2133	Schluter Long Ranger	Futaba	Enya
4	David Ramsey	2123	Schluter 222UT	Futaba	Webra 50

throbbing flight, he placed 1st. Daniel Carley placed 2nd with a good-looking Santini Air Jet Ranger; Dale Hart, who probably has the most frequently entered helicopter in Scale, took 3rd with his Long Ranger, and my 222UT placed 4th.

During Sunday's afternoon break, the crowd was treated to flight demonstrations of the Robbe/Schluter Whopper Autogyro, Robbe's "Charlie" Skydiver, Kalt's Electric Whisper and Kyosho's Electric EP.

I managed one of my best flights with the Whopper, and I even made a fairly tight loop. Since many of the contestants and spectators hadn't seen the Whopper fly, the flight was well-received.

Hybrid's Ray St. Onge carried Robbe's "Charlie" to altitude. (He had two of them this year.) With perfect chute releases, Chuck Wildey and Barry Wehrung maneuvered their skydivers safely to the ground. (There's nothing worse than hearing Charlie scream when his chute fails to open.)

Hobbico's Tim Lambe and Kalt's Cary Woolard demonstrated the flying abilities of electric helicopters. With Tim flying a Kyosho Concept EP and Cary flying a Kalt Whisper, they proved that these small helicopters can maneuver as well as their 60-size counterparts. Small electrics don't fly well in strong winds, however, and their power packs limit them to 5- to 7-minute flights.

Robbe provided the 4th-place awards for FAI, Intermediate, Novice and Scale. The outstanding Pilot Trophy award went to Stan Olzaski.

Prizes were donated by Airtronics, Futaba, Hobbico, Hybrid Mfg., Kalt, Miniature Aircraft, Morgan Fuel, Ralph's Hobbies, Rave's Mfg., Robbe and SR Batteries. Richie McGinnes won the prize in this year's raffle: a Magic helicopter, a Webra 60, a Futaba 7UHP and a Robbe gyro.

Special thanks to Robbe for sponsoring the Schluter Cup, to the West Windsor Flying Club for providing the manpower and the judges, to the Lehigh Valley Radio Control Society, to CD Vince Canzanese and to the volunteers, who helped make the Schluter Cup a great success. ■

IN MEMORIAM

Walt Schoonard (center) with his sons, Tim and Ted (behind him), and two employees (right).

WALT SCHOONARD

The R/C helicopter industry and hobby have taken some great strides forward in the last five years, and most were initiated by the insight and innovations of a handful of dedicated individuals. Walt Schoonard, who died on November 17, 1990, after a long illness, was among these. Walt was one of those responsible for the phenomenal growth of the U.S. R/C helicopter scene, and with his wife, Florence, and their two sons, Ted and Tim, he designed and produced a helicopter—the X-Cell—that currently enjoys an impressive share of the market.

Enthusiasts find it hard not to talk about Miniature Aircraft USA without also mentioning Walt's name. With Walt's death, we've lost someone who was dedicated to our hobby; he was tenacious, caring and never afraid to try new ideas.

To the Schoonard family, we extend the heartfelt condolences of helicopter enthusiasts everywhere. We know that those in the industry and hobby share your loss. We're all thankful for Walt's contribution to what binds us all together—a love of helicopters.

FIFTY YEARS AGO

(Continued from page 14)

chanics; Robert Morrison suggested dedicating the country's resources (including those of the auto industry) to a massive plane-building effort; and Douglas Ingells began a series on the life of cadets in Uncle Sam's pilot-training program that was obviously aimed at recruiting modelers. If you were a single male, age 20 to 26, had at least two years of college education, were in excellent health (e.g., you had 20/20 vision, all your own teeth, great equilibrium and no nasal obstructions!) *and* were good at geography, history, math, etc., you could have been a candidate. The workday was long (6 a.m. to 9:30 p.m.); the pay was OK ($75 a month and $1 a day for rations); and the nickname for new cadets ("dodos") was insulting—but it was for a good cause. Clearly, the threat of war was growing, and America was struggling to amass the planes and personnel necessary for a strong air force. ■

Y'NOT

(Continued from page 26)

cable.

Use the same system to hook up the rudder cables, then be sure that both surfaces follow the transmitter-stick movements. Make trim adjustments by lifting the servo arm off the servo and reducing tension, then sliding the cable one way or the other to adjust the trim. Always range-check any new radio installation.

PERFORMANCE

Since this is a hand-launched glider, start the test-flight with a hand-launch. With balance as shown on the plans, the radio turned on and the controls in neutral, point the nose down slightly, and give the Y'Not a nice smooth shove toward a point about a 100 feet in front of you. Don't be afraid to use the radio if the plane starts to stall or dive, and correct any turn that develops. Make any necessary trim changes to achieve a long straight flight path to a landing.

For its first real flight after you've established the proper trim, put the end of your index finger against the plywood pad on the bottom of the fuselage, point the nose up at about a 30-degree angle, and heave for all you're worth. Be ready with the transmitter to correct any tendency to loop or dive. As Y'Not slows down at the top of the launch, add a little down-elevator to prevent it from stalling, and then bring everything back to neutral for the glide. If you set up a gentle turn, you should be able to complete a couple of circles before landing. If you can find a thermal, see just how high Y'Not will go.

For a high-start launch, screw a tow hook into the pad on the bottom of the fuselage. A low-power high-start is more than adequate and is just the thing for schoolyard operation. Hang the high-start ring on the tow hook and walk downwind

(Continued on page 114)

Y'NOT

(Continued from page 113)

150 feet or so until the tension on the tow line feels about right. Keeping the wings level, point the nose up at the same 30-degree angle. Make sure the radio is turned on, and then let go!

Correct any side-to-side movement with rudder control, and apply a little up-elevator to maintain a climb. At the top of the launch, as the tension on the tow line slackens, use a flick of down-elevator to release the hook from the line.

For powered flight, remove the glider hatch cover and replace it with the power pod, which is attached in the same way as the hatch cover, but is held in place with two screws behind the engine pylon. With the power pod installed, the airplane is slightly nose-heavy, so a little up-elevator is necessary for level flight. The Cox .020 engine is actually a little too strong, so unless you live in the mountains, use 10-percent-nitro fuel content to decrease power output a little. On a full tank, the engine will run for about 3 minutes and climb quite high during that time.

Even if Y'Not doesn't glide as well with the power pod mounted, it's still good enough to thermal in anything but the lightest lift. So, throw, tow, or glow, Y'Not is ready!

**Here are the addresses of the companies mentioned in this article:*
MonoKote; *distributed by Top Flite, 2635 S. Wabash Ave., Chicago, IL 60616.*
Cox Hobbies Inc., *350 W. Rincon St., Corona, CA 91720.* ■

OPTIMIZED ELECTRIC

(Continued from page 37)

My conclusion?—both the SCR and the Trinity pushed packs provide top sport-flying performance in this wing.

OPTIMIZED ELECTRIC

Was there a "best" speed controller for the wing? I tested the new Astro 205 speed controller, the Tekin* 411P (designed for R/C cars) and Hobby Lobby's* Micro Mos 400 on my test stand, but there were no significant differences between low- and high-throttle run times. All are "high-rate" controllers—the latest generation in speed-controller technology (I use the Astro 205 in the wing). For the sake of comparison, I did try a "frame-rate" speed controller made some years ago, and I found that duration at half throttle was reduced by about 30 percent.

LESSONS LEARNED

If you build an Optimized Electric with a 200W motor, keep these tips in mind:

- Use metal-geared micro- or miniservos in the wings. Because I twice stripped one of the Futaba servos (once when landing, and again in flight when abruptly pulling out of a high-speed dive), I replaced them with with JR* S-3035 cobalt, coreless, metal-geared miniservos.
- An FAI turning an 11x7 prop on nine cells puts considerable stress on the

(Continued on page 116)

OPTIMIZED ELECTRIC

(Continued from page 115)

Leisure* gearbox drive gear, i.e., more stress than it was designed to handle: it can slip, and this results in a high-pitched "overtone" and a drastic reduction in rpm. To prevent drive-gear slippage in the Leisure extended gearbox, it's advisable to remove the nylon gear (it's held on by a friction grip), clean the oil off the shaft, and glue the gear back on with CA. For more security, notch the drive shaft and the facing surface on the inside of the gear with a Dremel tool, and then epoxy the drive gear back into place.

- The drive gear in the Leisure 2.5:1 extended gearbox (34 teeth) mates with the pinion gear (13 teeth) that comes on the Astro FAI 05 cobalt motor, for a gear reduction of 2.6:1. (For more information, see Part I.)
- When you install the ribs, laminate 1/32-inch lite-ply doublers to the full length of those defining the motor and radio-deck compartment, and epoxy light fiberglass to the inside of the balsa sheeting that defines the battery compartment.
- Trim the elevon tips so they don't overhang the wing tips. This will reduce the likelihood of the elevon servos being stressed during landings.
- NACA-style inlets built into the hatch provide adequate speed-controller ventilation; the batteries haven't overheated in the forward compartment.
- If you think launching a model into a crosswind is usually bad, you'll find it's worse with a flying wing. *Don't do it!*
- Ask someone else to launch the plane for you and, for safety, make sure that person wears a glove.

The Optimized Electric easily outpaces most glow trainers, yet if you fly it slowly, it's also capable of more than 10 minutes of powered flight, and still longer flights if you intersperse motor runs with glides. Flying this ship does require aileron experience. Beginners may find the wing's profile difficult to orient when it's airborne, although they'll quickly overcome this if they just keep thinking about where they were 3 seconds ago. If you're looking for something on the stealthy side that's a heck of a lot of fun, give it a try!

**Here are the addresses of the companies mentioned in this article:*

Astro Flight Inc., *13311 Beach Ave., Marina Del Rey, CA 90292.*

Hobby Dynamics, *P.O. Box 3726, Champaign, IL 61826.*

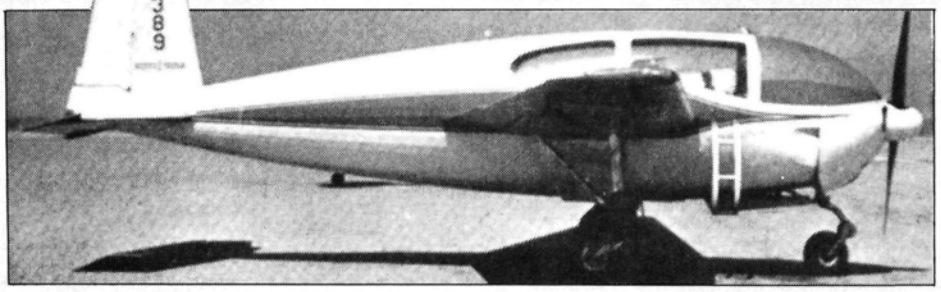
Futaba Corp. of America, *4 Studebaker, Irvine, CA 92718.*

(Continued on page 118)

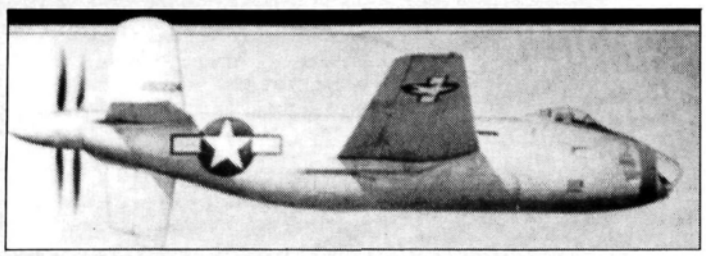
NAME THAT PLANE

CAN YOU IDENTIFY THIS AIRCRAFT?

If so, send your answer to Model Airplane News, **Name that Plane Contest** (state issue in which plane appeared), 251 Danbury Rd., Wilton, CT 06897.



Congratulations to James Gallant of Norwood, MA, for correctly identifying the Northrop XP-79B, which appeared in our January issue. (His response was one of more than 75 correct ones we received.) The experimental Northrop "flying-wing" fighter was designed to ram enemy planes and inflict enough damage to make them crash. With a wingspan of 38 feet, a length of 14 feet and a takeoff weight of 8,669 pounds, its maximum speed was 500mph, and its range was approximately 990 miles. The pilot lay prone in the center-line cockpit with one Westing-house 19B turbine engine on each side. Two fins were mounted on top of the engine fairings, and wingtip air scoops fed air to bellows that activated the horizontal control surfaces. Constructed of strong, welded, magnesium alloy, its first test flight took place on September 12, 1945—with a disastrous result. Test pilot Harry Crosby was killed, and the project was discontinued.



We goofed! *As many (too many!) of you noticed, a picture of the January '91 "mystery" plane showed up in the February '91 issue where the photo of the Douglas XB-42 medium attack bomber (the December '90 mystery plane) should have been. Hey, even experts make mistakes! No free subscriptions for pointing out that some propeller heads on our staff swapped the photos!*

The winner will be drawn four weeks following publication from correct answers received (on a postcard delivered by U.S. Mail), and will receive a free one-year subscription to **Model Airplane News.** If already a subscriber, the winner will receive a free one-year extension of his subscription.

OPTIMIZED ELECTRIC

(Continued from page 116)

Sonic-Tronics, *7865 Mill Rd., Elkins Park, PA 19117.*
SR Batteries Inc., *P.O. Box 287, Bellport, NY 11713.*
Trinity, *1901 E. Linden Ave., Linden, NJ 07036.*
Victor Engineering, *380 Camino de Estrella, Suite 170, San Clemente, CA 92672.*
Tekin Electronics, *970 Calle Negocio, San Clemente, CA 92672.*
Hobby Lobby International, *5614 Franklin Pike Cr., Brentwood, TN 37027.*
JR Radio; *distributed by Hobby Dynamics.*
Leisure Electronics, *22971 B Triton Way, Laguna Hills, CA 92653.* ■

QSAA RALLY

(Continued from page 63)

away, and this made it difficult to see (always a bad spot to be in).

His second plane was a Waco S3HD-A (an airplane I'd never heard of, and I pride myself on my knowledge of Waco biplanes. It just goes to show what pride can do!). This "one-off" plane was dressed in Cuban colors, and Claude's experience and expertise was obvious in the quality of its workmanship. It's a delight to see his well-built, beautiful models fly, and his surviving Waco was voted the Best Biplane.

There wouldn't be enough space in any magazine to describe all the models and events at the delightful 14th Annual QSAA Rally. As usual, the QSAA headquarters gang did an outstanding job: they made the modelers feel welcome, and the flight lines were well managed, despite their length. Thanks, also, to Connie Vaughn who let me fly her Pitts Special.

If you haven't been to the QSAA Rally, you're missing a fine event! ■

EZ CALM

(Continued from page 89)

once the plane is airborne, this is minimized, and more right thrust would solve the problem altogether.

The Calm likes a long, flat approach. Its glide is good, but the landing gear's nose-down attitude makes takeoffs and landings somewhat awkward. The plane showed no tendency to stall on landing—even when held off the deck at ridiculous attitudes.

The Calm 25 is easy to build and performs very well—like a good EZ aircraft should. I even managed some respectable FAI maneuvers on my first time out. This plane can do anything! My Airtronics radio never missed a beat, and the O.S. Max .32 FSR provided more than enough power. The Calm 25 is a small, yet solid, performer—one of the best in its class.

(Continued on page 125)

AIRWAVES

(Continued from page 95)

1.1 volts should be the cut-off point.

- *if the rate is between 500mA and 1 amp, cut it off at 1 volt.*
- *if the rate is above 1 amp, cut the discharge at .9 volt per cell (as when running motor packs).*

Regarding the "memory," one school maintains that battery memory is nothing more than voltage depression during discharge that's caused by repeated overcharging of partially charged cells. They argue that high-rate charge and full discharge (like racing motor packs) "washes out" the battery and precludes any memory problem. Car racers report that consistently running a racing pack until it's 80-percent depleted and then peak-charging it results in a battery that won't perform to 100 percent of its theoretical capability when that extra 20 percent of run time is needed. This effect can be eliminated by discharging each cell to .9 volt, recharging, and repeating the cycle four to five times.

A pack that has been partially discharged within the previous 24 hours can be peak-charged without harm, because the relative charge of the individual cells won't have drifted significantly. Larry Sribnick advises that if there's any question about an imbalance among the cells, the pack should be charged overnight at a slow-charge (C/10) rate, and then trickle-charged for a day or so to balance the cells finely. A trickle-charge is 1 to 2 percent of the mAh rating of the battery (e.g., 12 to 24mA for a 1200mAh battery). A continuous trickle-charge also safely maintains the existing charge of a Ni-Cd battery for an extended period. Again, for peak performance, car racers recommend that batteries be stored in a state of discharge. Don't subject an imbalanced, partially charged pack to a quick-charge rate (C/3) or fast-charge (less than 1 hour), because some cells might reach capacity before others. By the time the rest are charged, you may have damaged or vented any cells that peaked earlier.

You can call Larry Sribnick at SR Batteries, (516) 286-0079. He usually has time to answer questions on Ni-Cds. Look for further coverage of electrics, electric power systems and battery care in future issues of MAN.

We welcome your comments and suggestions. Letters should be addressed to "Airwaves," **Model Airplane News,** 251 Danbury Road, Wilton, CT 06897. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we cannot respond to every one.

PRODUCT NEWS

Descriptions of new products appearing in these pages were derived from press releases by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by Model Airplane News, or guarantee product performance. When writing to the manufacturer about any product described here, be sure to mention that you read about it in Model Airplane News.

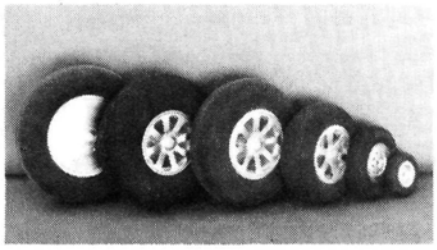
WING MFG.
Stealthbat ARF Glider

Wing Mfg. proudly introduces its new R/C super glider—the Stealthbat. It's sleek, extremely rugged and has a unique lifting body airfoil that gives outstanding flight performance. The Stealthbat's low-speed flight capability allows R/C novices time to think and respond, but its clean lines make it an exciting aerobatic performer for experienced fliers. It's controlled by full-length elevons that are linked to a mechanical mixer, which, in turn, is linked to the aileron and elevator servos. The Stealthbat also has a collapsible sub-fin that's extremely effective in producing straight high-start launches. Its airframe incorporates expanded "polyfoam" wings with hardwood leading edges, a tough plastic fuselage fairing, finished balsa elevons (already attached), a mechanical mixer assembly and a rugged plywood center spine with a built-in high-start slot. It comes completely finished and ready to fly.

The Stealthbat has a 45-inch wingspan and a 798-square-inch wing area, and it weighs only 1 pound, 14 ounces, with radio gear.

Price: $139.95

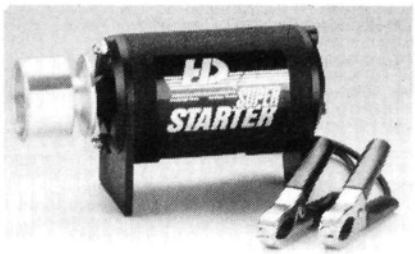
For more information or a catalogue ($4.50), contact Wing Mfg., 306 E. Simmons, Galesburg, IL 61401.



GLENNIS AIRCRAFT
WW II Scale
Wheels & Tires

These custom-designed wheels are machined from bar-stock aluminum and have solid rubber tires that hold the heavier scale aircraft. Scale wheels are available for most aircraft, including 1/5-scale P-51, P-38, P-47, ME-109 and Corsair. The correct face, with the scale number of spokes or holes, is authentically cast of aluminum to cover the wheel collar. Tread is to scale, too—straight, diamond, block, or the cross type used on German aircraft.

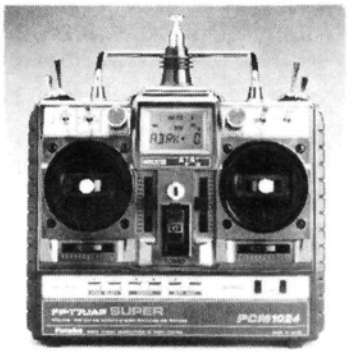
For more information, contact Glennis Aircraft, 5528 Arboga Rd., Linda, CA 95901.



HOBBY DYNAMICS
HD Super Starter

The new, high-powered, HD Super Starter has a 12V DC motor. It will handle up to 120-size engines with no problem, and it's perfect for use with 1/4-scale engines! This top-quality starter has great features: extra-long heavy-duty cord, factory installed battery clips, all-metal case, built-in rest stand and non-mar rubber drive cone (for use when starting without a spinner).

For more information, contact Hobby Dynamics, P.O. Box 3726, Champaign, IL 61826.

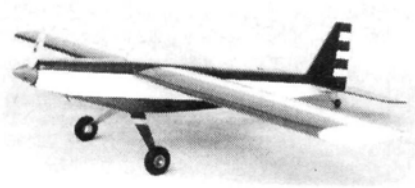


FUTABA
7UAPS & 7UAFS

Futaba's DP-7UAPS 7-channel PCM 1024 System includes: R129DP PCM 1024 receiver, four S148 servos and Ni-Cd power packs. It has four-model memory with aircraft, glider and helicopter software, an LCD computer screen, ATV (seven), dual rates (three), programmable mixing, a timer, snap roll, servo-reversing, a plug-in RF module and a trainer system. It operates on 50 and 72MHz.

The FP-7UAFS 7-channel FM System has an R128DF FM receiver and all the other features of the PCM system.

For more information, see your local hobby dealer, or contact Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.



CARDEN CORP.
Maverick 40

Carden has introduced another sport/aerobatic design. The Maverick 40 offers a smooth performance throughout a wide speed range. Landings are slow and predictable, and its positive control and stability in strong wind will particularly help inexperienced pilots. It's a great second airplane for aerobatic training. It's engineered to accept .40 to .50 4-stroke or 2-stroke engines. Specifications: wingspan—56 inches; wing area—630 square inches; weight—5 1/4 to 5 1/2 pounds; wing loading—19 to 20 ounces per square foot.

With very few parts, these planes can be ready for covering in 8 to 10 hours. The kit features the finest balsa, precision-cut parts ("edge-trued" for a perfect fit), foam-core wings with balsa skins, custom ailerons and top-quality hardware. The rolled plans are easy to read, and the detailed instruction manual includes construction photos.

Price: $114.95—introductory special, $79.95 (plus $5 S&H).

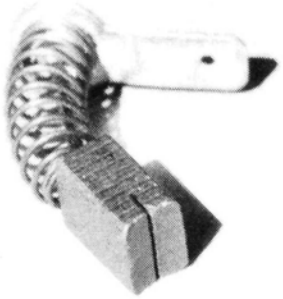
For more information, contact Carden Corporation, 1731 N.W. Madrid Way, Boca Raton, FL 33432.

BADGER AIR-BRUSH CO.
The 350-4 Airbrush Set

The Model 350-4 airbrush set has three fluid assemblies and needles that enable you to spray almost any liquid. The 350-4 is easy to use and clean so it's ideal for beginners as well as experienced modelers.

Price: $65

For more information, contact Badger Air-Brush Co., 9128 W. Belmont Ave., Franklin Park, IL 60131.



ASTROFLIGHT
Slotted Racing Brushes

Astro now offers a racing brush with a unique slotted face. This brush design runs more coolly and with much less sparking. The lower temperature at which it operates greatly increases its life, and the reduction in sparking decreases commutator erosion. The brush also has a heavier brush spring and larger shunt wire to provide a lower voltage drop and increased power output. Fliers can expect 500 runs on one set of brushes.

Part nos. 5044 (fits Astro .035 through .15 motors); 5045 (fits Astro .25, .40 and .60 motors).

Prices: $9.95 and $19.95/pair.

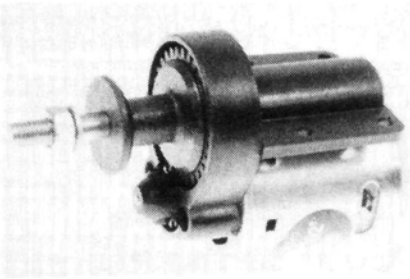
For more information, contact AstroFlight Inc., 13311 Beach Ave., Marina Del Rey, CA 90292.

AIRBORNE ELECTRONIC SYSTEMS
Battery Back-Up System

The Airborne Watchdog (model AW1-S) is an onboard battery back-up system. Designed for use with all radio systems, the AW1-S constantly monitors the receiver battery voltage. When the main battery voltage falls below a pre-set safe level, the unit automatically switches to a back-up battery and activates a warning circuit that sounds an alarm when the plane has landed and the transmitter is turned off. All switching is fully electronic, switching time is within a thousandth of a second, and normal flight control isn't changed. With the standard N-size back-up battery, operation in back-up mode lasts more than 1 hour. When used with a rechargeable Ni-Cd back-up pack, charging of the standard receiver pack is automatic.

Price: $39.95

For more information, contact Airborne Electronic Systems, 16055 Caputo Dr., Unit D, Morgan Hill, CA 95037.



HOBBY LOBBY
Mini Olympus Electric Gear Drive

The Mini Olympus Electric Drive provides electric power for small R/C models. This 40W RS380 electric motor with a 2.3:1 gear-reduction drive, is 3 1/4 inches long and weighs 3 1/3 ounces. It will power an R/C airplane as if it were a .049 or a .07 glow engine. Unlike a glow engine, however, the Mini Olympus allows the use of a large-diameter propeller (8x6) that's more efficient than direct-drive props and more realistic on scale airplanes.

For more information or a free catalogue (in the USA), contact Hobby Lobby International, 5614 Franklin Pike Circle, Brentwood, TN 37027.

CLUB OF THE MONTH

THE VALLEY EAGLES R/C CLUB
16131 Black Bear Dr., Anchorage, AK 99516

Those who are familiar with the Matanuska Valley will tell you that it's 40 miles northeast of Anchorage, AK, and that it's known for its farming, the Alaska State Fair and the town of Palmer. They might also tell you that there's a new flying club out there called the Valley Eagles R/C Club. Although it's only two years old, the club is already an AMA Charter Club, and it has increased its membership by 300 percent to over 60 members. Last August, members organized and hosted the first Alaska R/C Championships, which was the biggest R/C event ever held in the state. The Valley Eagles also claim to have the best grass flying field in the state—pretty impressive credentials for such a young club.

What about the weather for the Statewide Championships?—probably on the cool side, you say? (after all, this is Alaska). Try a record-breaking 80 degrees for the entire weekend. Sixty-four entrants flew in four events, and the Eagles are already planning to host a 1991 State Championship.

Members have managed to combine a relaxed style with a no-nonsense approach to safety."Safety seems to be more of an attitude than an enforced rule," writes Valley Eagle member Bob Stephens.

Of course, there are always business matters to resolve: a possible dues increase, elections, safety considerations and noise limitations. Several options have been suggested for raising dues; they include offering a special rate for young people, senior citizens and families. ("One of the nicest things that has happened to the Eagles is family participation.") One member suggested that dues be kept at their present rate. "Being broke makes it easier to get volunteers for work parties. People are just more helpful when we can't afford to do it any other way." (There's some interesting psychology at work here.)

The Valley Eagles might be a fledgling club, but they're off to a great start. Good luck with the 1991 Statewide R/C Championships. May your weather again be tropical, and shorts and sandals abound.

Congratulations. Enjoy your two, free subscriptions.

MODEL AIRPLANE NEWS

HOBBY SHOP DIRECTORY

Retailers: Make your business grow with new traffic! Now you can advertise your hobby shop in the **Model Airplane News Hobby Shop Directory**. The listing will be published monthly and will be listed according to city and state. You will have 3 to 4 lines, approximately 20 words, in which to deliver your sales message, plus space for your store's name, address, and telephone number.

HOBBY SHOPS: Act now and get first ad free!
Directory space is sold on a yearly basis with a choice of three payment plans: 1. $179 per year, payable in advance; 2. $97 for six months, payable in advance; or 3. $17.50 per month to be billed monthly. Space reservations must be received by the 20th of the third month preceding publication (for example, January 15th for the April issue).

ALABAMA—Huntsville
4.5 miles east of the Alabama Space and Rocket Center. Complete line of Radio-Control, Free-Flight, and Control-Line Airplanes and Hardware, HO&N Scale Trains, Rockets, Ships, and Plastics. Hours: Mon-Fri, 9-6; Sat, 8-5; Sun, 12-5. Daily UPS pickup.
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CALIFORNIA—Torrance/Gardenia
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Connecticut's leading R/C shop, 15 years experience flying and selling radio control. Over 3,500 different items in stock. Custom ordering for hard-to-find parts.
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- Dealer for Yellow Aircraft
- Send $3 for yellow info pack
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420 W. S.R. 434 **(407) 327-6353**
FAX (407) 327-7148

ILLINOIS—Chicago
Chicago's largest hobby shop. R/C planes, helicopters, boats, and cars. R/C Repairs, installations, and custom building. Mon.-Fri. 10-9; Sat. 9-6; Sun. 11-4.
STANTON HOBBY SHOP, INC.
4734 Milwaukee Ave. **(312) 283-6446**

OHIO—Findlay
Findlay's local R/C dealer, planes—cars—boats. We specialize in R/C, large selection of kits, accessories, and parts. We are authorized Sig and Dremel dealers. Also sell plastic kits and model rockets. Tue. & Thu. 3-9, Mon., Wed., Fri., & Sat. 10-9.
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LARRY'S HOBBIES
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Apartado 529, Centro Colon **32-26-81**

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251 Danbury Rd., Wilton, CT 06897.
For further details or information on our special introductory offer, call toll-free 1-800-243-6685 and ask for Laura Kidder.

EZ CALM

(Continued from page 118)

**Here are the addresses of the companies mentioned in this article:*
EZ Sport Aviation/Hobby Shack, *18480 Bandilier Circle, Fountain Valley, CA 92728.*
Hot Stuff, *Satellite City, P.O. Box 836, Simi, CA 93062.*
O.S. Engines/Great Planes Model Distributors, *1608 Interstate Dr., P.O. Box 4021, Champaign, IL 61820.*
Sullivan Products, *1 North Haven St., Baltimore, MD 21224.*
OK Models/Global Hobbies, *10725 Ellis Ave., Fountain Valley, CA 92728.*
Airtronics, Inc., *11 Autry, Irvine, CA 92718.*
RJL Enterprises, *1831 Business Center Dr., Duarte, CA 91010.*
Mac's Products, *8020 18th Ave., Sacramento, CA 95826.*
APC Props/Landing Products, *P.O. Box 938, Knights Landing, CA 95645.*
PowerMaster Products, Inc, *10103 Freeman Ave., Santa Fe Springs, CA 90670.* ■

QUIET FLIGHT

(Continued from page 94)

AstroFlight* FAI 6-turn cobalt motors, which are buried in its wing and are powered by 16, 1700mAh Sanyo cells. The direct-drive props are on extension shafts, and the N9M-A's all-up weight (with retracts) is a hefty 6 1/2 pounds. This striking model exhibits a well-done, stand-off-scale finish.

People lined the runway to see and take pictures of this plane. (Everyone desperately wants to see this type of plane fly, but there's always a nagging feeling that it just won't make it.) The N9M-A took off in grand style! Its takeoff run was long, but when it left the ground

(Continued on page 126)

QUIET FLIGHT

(Continued from page 125)

and retracted its gear, it didn't lack power. Most spectators were surprised by the model's stability, given that its only vertical area is that which supports the prop shafts.

Although the model achieved flight speed very quickly, it wouldn't lift off until it reached a specific spot in the runway. At this spot, there was a small bump that ran the width of the runway, and it seemed to cause the model to rotate. Rich Uravitch (former *MAN* editor) ran into a similar situation when he reviewed an EZ F-16 ARF pusher-jet model. It seems that when full throttle is applied to some pusher jets, the thrust angle of their engines puts a down load on their nose gear. This down load was probably what kept Bob's model glued to the runway until it encountered the bump.

With the F-16, Rich's solution was to run it up to flying speed, back off the throttle (unloading the nose gear), pull up-elevator to rotate, and get right back into throttle. Perhaps Bob should practice this technique with his N9M-A. Anyway, a hearty congratulations to Bob on his win, and his success with such an unusual electric model.

Till next time...good thermals and a full charge!

**Here are the address of the companies mentioned in this article:*
***Global Hobby Dist.**, 10725 Ellis Ave., Fountain Valley, CA 92728.*
***Hobby Shack**, 18480 Bandilier Cir., Fountain Valley, CA 92728.*
***Graupner**; distributed by **Hobby Lobby International**, 5614 Franklin Tpk., Brentwood, TN 37027.*
***Simprop**; distributed by Hobby Lobby.*
***AstroFlight**, Inc., 13311 Beach Ave., Marina Del Rey, CA 90292.* ■

PROPELLER FACTS

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driven aircraft, the higher its efficiency. Less energy is wasted in the form of engine heat, air turbulence and noise generation.

The thrust we need to keep our airplanes flying comes from the reaction that results when we push an air mass rearward. If this mass is low (like that behind a small prop), it must be accelerated quite a lot to produce appreciable thrust, and efficiency suffers. On the other hand, the air mass affected by a big prop needs much less acceleration to achieve its thrust output. (Similarly, a single-blade propeller outperforms multi-bladers: for the same shaft power, it can be much bigger in diameter.)

Large, low-pitch props tend to minimize variations in their models' air

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CLASSIFIED

Send ad and payment to *Model Airplane News*, 251 Danbury Rd., Wilton, CT 06897. Non-Commercial classified ads (commercial ads of any kind not accepted at this special rate). Rate: 15 words or less, $4.50 payable in advance. No charge for name and address. Additional words, 25¢ each. Commercial classified ads (rate applies to anyone selling on a commercial basis–retailers, manufacturers, etc.) Rate: 50¢ per word, payable in advance. Count all initials, numbers, name, address, city and state, zip and phone number. Closing Date for either type of ad is the 20th of the third preceding month (for example, January 20th for the April issue.) We do not furnish box numbers. If you would like your ad run in more than one issue, multiply amount of payment by number of months that ad is to run. It is not our policy to send sample copies of tear sheets.

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WANTED: Model engines and race cars before 1950. Don Blackburn, P.O. Box 15143, Amarillo, TX 79105, (806) 622-1657

JET ENGINES: Dyna-Jets, Turbonique, Microjet, Jet-X and more. (Sorry no ducted fans.) See our display ad in this issue. DOYLEJET.

PROPELLER FACTS

(Continued from page 126)

speeds, and I like that. At takeoff and at low model velocity, they pull hard —just when high thrust is needed—but as air speed increases, their thrust diminishes proportionately. The faster the model flies, the smaller the prop blades' effective attack angle becomes. Below about 3 degrees, thrust output drops sharply. If the blades' angle of attack goes all the way down to zero degrees (as in a high-velocity dive), the prop may even act as an air brake!

BLADE STIFFNESS

Blade stiffness affects propeller performance. Flexible blades will bend and twist as a result of forces generated by engine torque, their flywheel action and aerodynamic effects. There's little likelihood that such bending and twisting will improve efficiency.

I've performed many experiments with props that have the same shape but are made of materials that differ with regard to flexibility. In every test, the stiffer the blade, the higher the thrust output! Stiffness is the main reason reinforced-plastic

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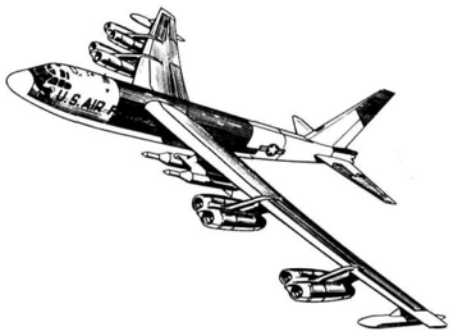
PROPELLER FACTS

(Continued from page 129)

propellers work so much better than the earlier plain nylon props.

SUMMARY

For *optimum* thrust and efficiency and *minimum* noise output, use props with *stiff* blades. Most engine-powered R/C trainers, sport models and scale airplanes perform best when their prop's diameter is roughly twice its pitch, e.g. 7x3, 9x5 and 12x6—with maximum motor speed in the 10,000 to 12,000rpm range. ■



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